March 27, 1950

STEEL

The Magazine of Metalworking and Metalproducing

CONTENTS — PAGE 29

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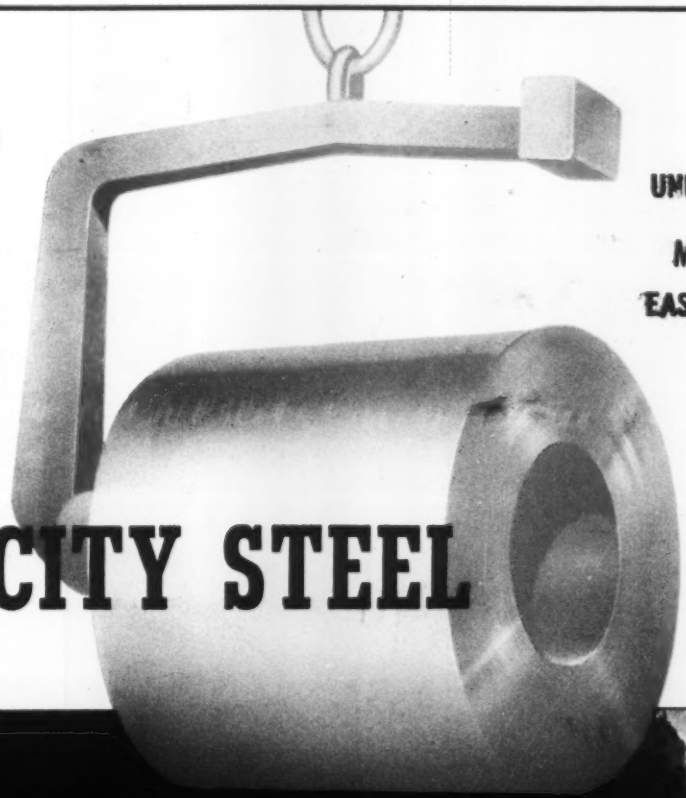

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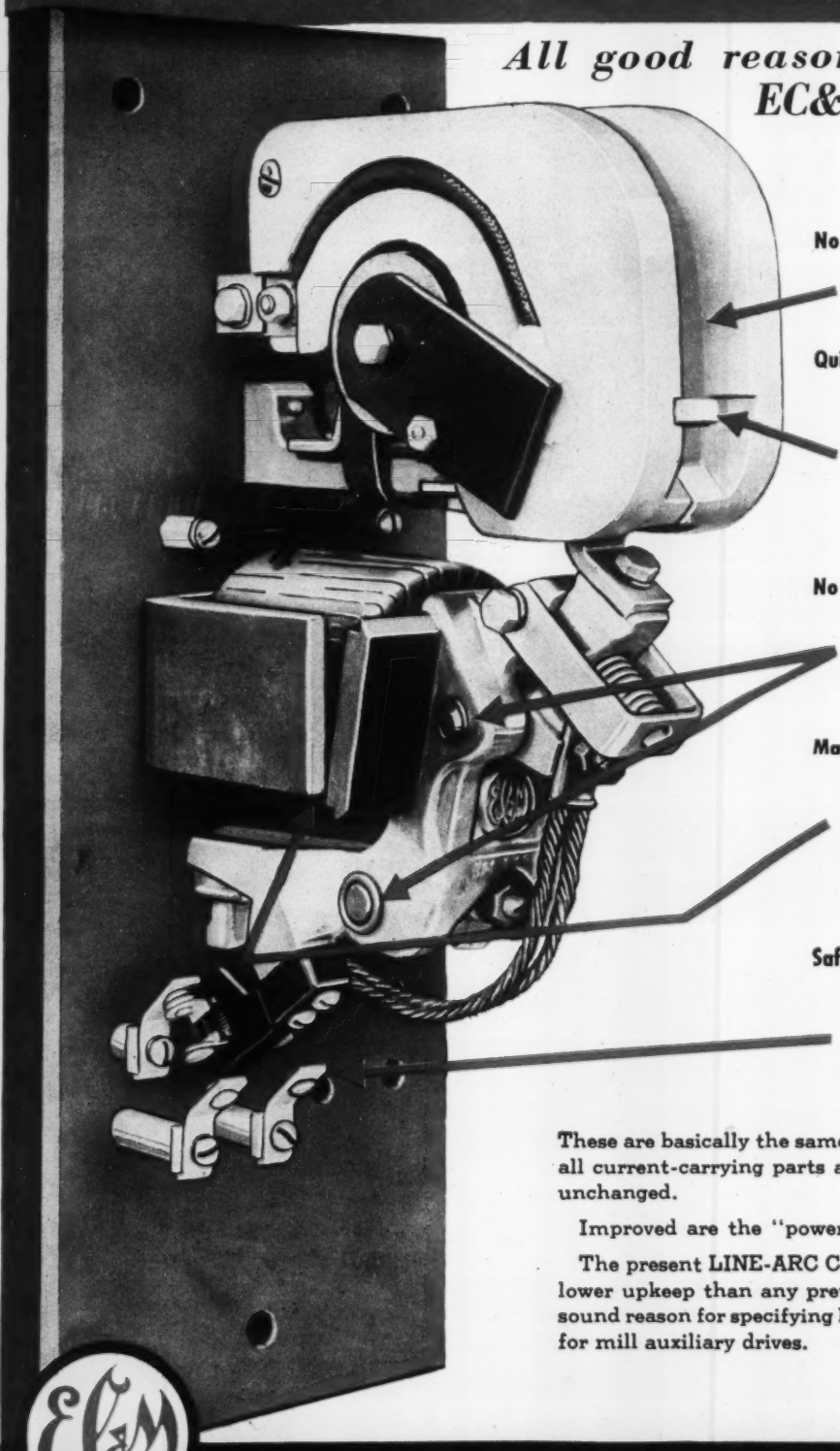

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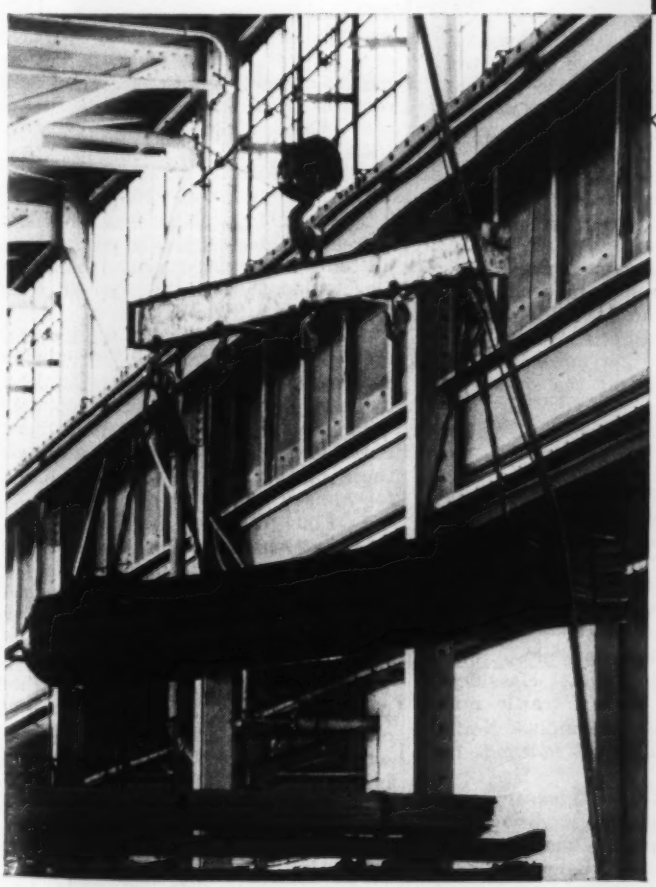

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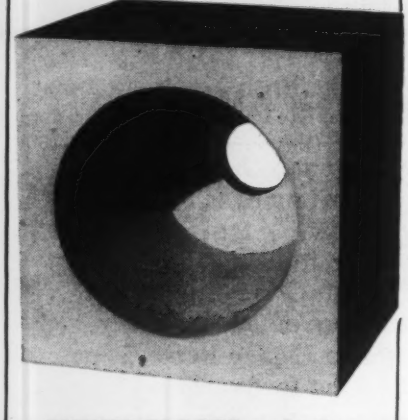

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Behind the Scenes . . .

Coming Up

The editors have a number of features coming up to help you readers.

One, scheduled for next month, is our 25th annual financial report of the steel industry. Compiled by Associate Editor Vance Bell, the summary contains information obtainable nowhere else. Included will be special data not found in steel company annual reports but based on our own questionnaires sent out each year. Companies that produce more than 90 per cent of all the steel made in this country will be represented. It's a complete, exhaustive job that industry waits for.

Another idea-filled feature will be unveiled next week, Apr. 3. The entire production-engineering section will be devoted to cost-cutting through better tooling methods, to tie in with American Society of Tool Engineers' show in Philadelphia Apr. 10-14.

Included in this issue will be:

An article by Guy Hubbard, dean of machine tool editors, showing how advances in tooling methods can help industry cut costs.

An article by A. H. Allen, our widely known automotive editor, who will explain how industry can cut costs by applying automation, a name coined by Ford engineers to describe automatic production techniques.

An article on how to cut costs by proper selection of tooling materials, based on Westinghouse Electric Corp. research.

A pictorial display showing how one of the world's most modern plants has applied the latest tooling methods in cutting costs.

An easy way to get more information on new things at the show.

Noibn

The editors pride themselves on general all-around wordability, but last week in working up a freight rate story they were stumped. The matter in question appeared in a listing of steel products for which eastern railroads want lower rates. One product was listed as "pipe, plate or sheet, noibn in official classification." A check with a traffic man solved the problem in a minute. Noibn means "not otherwise indexed by name."

We're working up a glossary now and, besides noibn, we have:

N.e.c.—not elsewhere classified.

Uniscan—Tentative name of proposed economic union of United Kingdom and Scandinavian countries.

Fibenel—Tentative name of proposed economic union of France, Italy and Benelux (Benelux is Belgium, Netherlands and Luxemburg).

Fritalux—Same as Fibenel.

Mechanical Backtalk

We've been having quite a time with a new dictating machine lately. We were a little uncertain about how the thing worked, but we went blithely ahead anyway and tried it.

After we had dictated our letter—it was a note to head off an insurance man—we manipulated the gadgets to hear what we had said.

What we heard was an exasperated masculine voice asking: "Can Shrdlu work those blasted puzzles?"

We're not telling!

Puzzle Corner

The number puzzle of Mar. 13 brought us so much mail that we can't acknowledge it all. William B. Thuesen of Illinois Steel Tank Co. was one of the first to send in a correct answer. There were, of course, many correct solutions. Here are some of them:

567	684	666	666	909	774	882
345	363	543	444	606	453	561
222	321	123	222	303	321	321

The number problem was more like a free dividend. Here's a puzzle, submitted by Earl A. Ragland of Brush Development Co., that you'll have to work on a little harder.

Jack, upon arriving at Jim's house, noticed a large number of children playing in Jim's backyard. Thinking it unusual to see so many children in one place, Jack asked how many children were present. He was given these facts and told to figure it out for himself.

1. Four families are represented. 2. Less than 18 children are in the yard. 3. No two families have the same number of children. 4. Product of the numbers of children in each family is equal to Jack's house number.

Jack figured for a while, then asked if the smallest family consists of one or two children. Jim told him, and Jack gave the answer. What is it?

Shrdlu

(Editorial Index—page 29)

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STEEL

The Magazine of Metalworking and Metalproducing

VOL. 126, NO. 13 MARCH 27, 1950

NEWS

★ As the Editor Views the News 31
★ News Summary 35
Government Woos Small Business 37
Tax Revision? Not Now 37
Control Steel Prices? 37
Product Emphasis Shifts for Jones & Laughlin 38
Tool Exports Climb 38
GM Prepares for Union Trouble 39
Spotlight on Cold Extrusion 40
New Plants for Timken 41
Hyster Buys Turret Trucks 42
Railroads Favored by Westinghouse 43
More Roads Needed 43
★ Windows of Washington 44
U. S. Finds Road Rougher in Latin Markets 48
Navy's New Laboratory Can Work Under Any Condition 49
★ Mirrors of Motordom 51
★ The Business Trend 54
Strong Appliance Demand Seen for Year Ahead 56
More Unemployment Worries Administration 57
★ Men of Industry 58
★ Obituaries 63
★ Metalworking Briefs 136

PRODUCTION-ENGINEERING

★ Production and Engineering News at a Glance 65
Closing Research-Manufacturing Gap Brings About Major Production Economies 66
Hot Pressing Beryllium Powder 71
★ Progress in Steelmaking—Automatic Controls for Open Hearths 76
Fast Repetitive Shaft-Turning by Duplicating Device 83
Open-Hearth Steelmakers Stress Control of Bath Temperature 84
★ Calendar of Meetings 97
★ Letters to the Editors 98
★ New Products and Equipment 101
★ Helpful Literature 109

MARKETS

★ Market Summary 111
★ Metal Prices and Composites 112
Nonferrous Outlook Bright 118

★ *Denotes regular features*

Advertising Index—Page 142. Editorial Index available semiannually; STEEL also is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18

Next Week ... **COST-CUTTING ASTE EXPOSITION: Tooling Advances Cut High-Cost Production ... "Automation" May Spell Lower Production Costs for You ... Chevrolet Licks Costs with Tooling Ingenuity ... Evaluation of Cutting Tool Materials**

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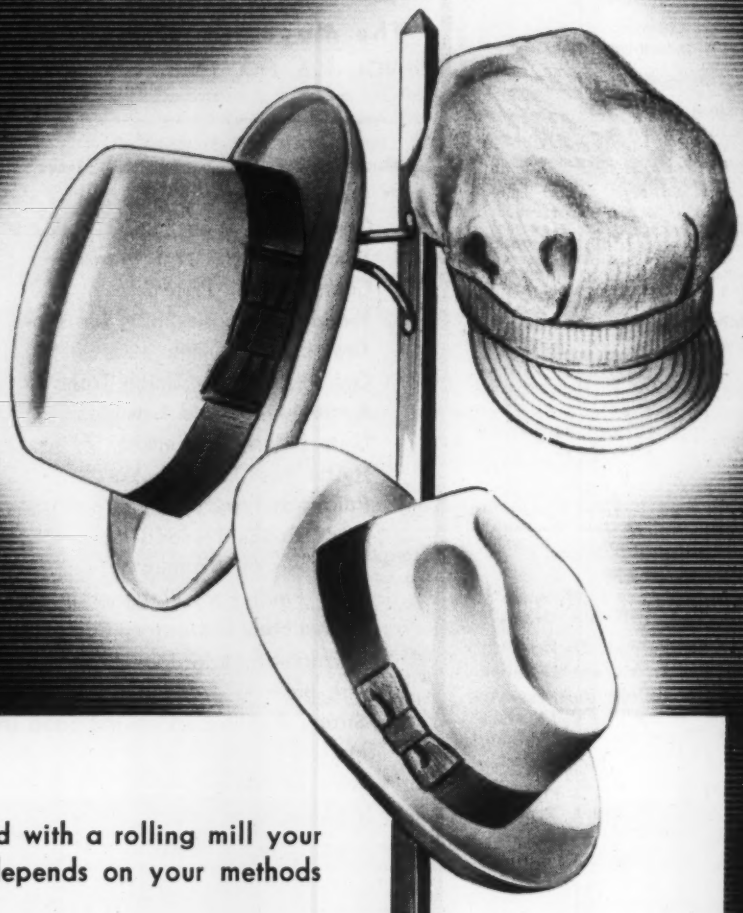

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March 27, 1950

How To Increase Competition

No individual in a responsible position in industry can afford to be complacent in regard to the majority report of the Congressional Joint Committee on Economic Report issued last Thursday. As stated on this page two weeks ago, most of the proposals are dangerous. If they were adopted for steel, they later would be imposed upon other commodities and a new and totally unnecessary bureaucratic monstrosity would become entrenched in Washington.

Specifically the majority report proposes: 1. Systematic studies by Federal Trade Commission of prices, output, costs and profits of each of the major steel producers and keeping this information currently available for use by Congress. 2. Notification to FTC by steel companies of contemplated increases in prices and cooling-off period of 30 days before increases become effective to enable FTC to investigate and hold hearings. 3. Further study by the committee of means whereby a greater degree of competition within the steel industry can be achieved. 4. A study to determine whether the steel industry should receive public utility treatment from the government.

In a minority report, Senators Taft, Flanders and Watkins and Representatives Wolcott, Rich and Herter disagree with all of the recommendations of the majority except No. 3, pertaining to competition. That there is full agreement on this proposal is significant because competition is the key to the problem the committee is investigating.

Proposal No. 3 calls for determining how "a greater degree of competition within the steel industry can be achieved." It is difficult to see how the red tape of reporting and regulation in proposals Nos. 1, 2 and 4 would increase competition. On the contrary they more likely would retard competition and might easily lead to price regulation and price fixing.

The simplest way to achieve "a greater degree of competition" is to permit present natural forces to create the inevitable buyers' market which lies ahead. Competition in such a market will do everything and more that is contemplated in the complicated proposals of the majority report.

The trouble has been that a government-espoused synthetic crisis has bobbed up every time a buyers' market was approaching. Remove these artificial road blocks and we will see a return to the intense, healthy, normal competition which the industry needs.

* * *

AIDING THE RAILROADS: American railroads are in a tough spot. As S. M. Felton, president of the American Railway Car Institute, points out, they "stand alone as the only form of public transportation which is not subsidized. Other forms of transportation use highways, waterways and airports built and maintained by the people's taxes, including taxes paid by the railroads."

As a result of these and other discriminations, the rail carriers are forced to wage a desperate battle for survival. They need understanding on the part of shippers and the public of their plight to the end that corrective measures may be taken before it is too late to save the roads from nationalization—which would be their inevitable fate if they become too weak.

Westinghouse Electric Corp. has weighed carefully the importance of an efficient railroad service to its operations. Its "support-the-railroads" policy was outlined by Vice President Andrew H. Phelps to the Western Railway Club in Chicago. "Truck service can ruin but not replace rail service," said Mr. Phelps. "Westing-

(OVER)

house cannot afford to contribute to the railroads' collapse and thus lose their universal, indispensable, all-around rail service and be forced to rely on highly restricted and specialized truck service."

Westinghouse will use railroads for all shipments unless trucks offer important advantages in service or lower rates. When truck rates are lower than rail rates, railroads will be given a chance to make adjustments that will enable the company to ship by rail at competitive rates.

The Westinghouse policy merits the careful consideration of all shippers. —p. 43

* * *

COMPLICATED PROBLEM: When United States forces ousted Japanese from small Kwajalein island, the Navy, Army and Marine Corps each established its own fleet of motor vehicles and each maintained its own stock of spare parts. How advantageous it would have been if a single pool of cars could have served all three units!

The foregoing is an over-simplified illustration of the problem of standardization being tackled by the Munitions Board. Its goal is maximum interchangeability of parts and it has selected the internal combustion engine industry as a guinea pig for its research into standardization. For almost a year it has been working with an industry advisory committee in efforts to effect greater interchangeability of fast-wearing parts of marine, automotive and general purpose internal combustion engines.

Experience to date emphasizes the fact that the problem is difficult and complicated and that progress will continue to be slow. —p. 44

* * *

WIRE SHOT CUTS COST: R. J. Emmert's account of the work of the process development section of General Motors Corp. with shot for cleaning and peening is fascinating. The section first was asked to find a way of separating fine broken up shot material from that which was still useful so as to reduce shot consumption. Soon it became apparent that instead of trying to utilize cast shot more effectively, the section should try to find a shot which would not break up.

Study indicated the shot should be tough, ductile and as hard as spring steel. SAE 1065 hard drawn spring wire was selected and a machine improvised to shear off diameter lengths of the wire. The wire shot ran 1670 cycles in a Pangborn shot testing machine compared with 41 cycles for the best conventional shot. If cut wire shot were to be used in all GM plants, the cost would be reduced $540,000 annually. However, practicability of using wire shot for cleaning castings has yet to be proved because of excessive carryout. —p. 66

* * *

SEEKS PENSION STUDY: Annual report to policyholders of the New York Life Insurance Co. contains a constructive proposal regarding pensions. "Whether provided by government or private industry, pensions deserve thorough discussion and public debate," states the report. "Their impact upon our economy and society, who will pay for them and how the cost will be met are important considerations. Up to now, primary attention has been paid to benefits rather than how promises will be fulfilled."

The company proposes creation of a commission of representatives of government, management, labor and the public, appointed at "the highest level," to conduct a comprehensive study of all phases of the pension problem. Such a report—something on a par with the Hoover Commission report on government organization—would go a long way toward clearing away the current wholesale confusion regarding pension plans. —p. 39

* * *

TEST COLD EXTRUSION: A half-dozen companies are using cold extrusion in the manufacture of shells, cartridge cases and other ordnance items for the Defense Department. Some of the results of this experimental work were revealed at a symposium presented before members of the Pressed Metal Institute.

According to Col. Merle H. Davis, chief of the Industrial Division of Army Ordnance, cold extrusion has promising cost-saving possibilities. Scrap loss is reduced, machining operations are simplified, cold working produces desirable physical properties and extrusion results in a superior surface finish.

Work on cold extrusion of steel already has benefited conventional drawing techniques. Phosphate coatings used in cold extrusion have been found to improve quality of the work and reduce scrap losses when used on some difficult deep-drawing operations. Pressed metal companies may well explore the possibilities of cold extrusion in commercial work. —p. 40

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

FEDERAL AID TO BUSINESS—Look for the White House to dust off Senator O'Mahoney's capital bank scheme to aid small business (p. 37). The reason: The administration doesn't want Congress to take any action on taxes this session, but it thinks it politically wise to do something for the little fellow. The proposal, soon to be hustled to Congress, provides that the government back loans made through a chain of banks set up with private capital. . . The O'Mahoney committee report on the steel price hearings (p. 37) contains the expected attack on big business. One proposal would have Congress study the question of whether the steel industry should be considered as a public utility.

BUSINESS OUTLOOK—Both immediate and long-term business prospects are promising (pp. 54-57). STEEL's industrial production index, at 187, is 7 points higher than for the corresponding week a year ago. Steel, coal, auto, construction, machine tool and appliance industries are all going at a good clip. Fly in the ointment is rising unemployment. It's not serious yet—only 4.7 million or 7.4 per cent of the total labor force—but it has increased since 1948 when it was only 3.3 per cent of the labor force . . . Machine tool exports rose to $77.9 million in 1949, an improvement over the 1948 showing, but still under the 1947 total (p. 38).

NONFERROUS PROSPECTS—The full-tilt pace of industrial production means good busines for producers of nonferrous metals and products (p. 118). High level activity in construction, appliance output and auto assemblies supports the nonferrous market.

AUTOMOBILES— Are you getting more price conscious? Auto makers think their customers are (p. 51). The producers are doing something about it by shifting emphasis from deluxe to standard models with lower price tags. Studebaker's forthcoming Champion is the latest example of the trend to a less expensive car. Two new models—the Nash Rambler and a small Kaiser-Frazer entry—are coming up that probably will be priced under the Chevrolet-Ford-Plymouth level. The pressure on prices means more heat on suppliers for simplified parts design and increasing standardization.

LABOR— The United Auto Workers' pension-insurance drive will shift into high gear when negotiations begin with General Motors Corp. next month (p. 39). Indications are that demands will be even stiffer than those presented to Chrysler Corp. GM is reported to have warned suppliers to prepare for the worst—maybe a 60-day suspension beginning in late May or June. Nash-Kelvinator Corp. just signed up with the UAW and will pay ten cents an hour per hourly employee for a pension and insurance program.

TRANSPORTATION— You can expect the truck-railroad battle to reach a climax soon. Preliminary skirmishes include the proposal by eastern railroads to cut rates on certain steel products, the announcement by Westinghouse Electric Corp. (p. 43) that it will help the railroads by shipping via rail rather than truck whenever possible and the proposals by American Road Builders Association (p. 43) that the U. S. double its highway-aid program to $1 billion a year.

LATIN AMERICA— If you sell to Latin America, prepare for a rougher sales road ahead (p. 48). The dollar shortage and lower prices for European products because of devaluation are hurting U. S. sales in that area. Our exports there are still above prewar levels but below the postwar peak.

HERE AND THERE IN INDUSTRY—The cold extrusion metalworking process, still in the developmental stage, has good commercial possibilities, speakers told a Pressed Metal Institute symposium (p. 40) . . . Timken Roller Bearing Co. will build two new plants in Bucyrus, O. (p. 41) . . . Jones & Laughlin Steel Corp.'s product mix has changed markedly in the past 15 years; once only 1 per cent of its total output, sheet and strip now account for 40 per cent of production (p. 38) . . . Western Germany has contracted to buy nearly 3 million tons of high-grade Swedish iron ore.

Production-Engineering News—p. 65 Market Summary—p. 111

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STEEL
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Government Woos Small Business

Fifteen-year tax incentives, insured loans through capital banks proposed for little enterprises, but no action is expected on business tax reforms

WATCH for a new White House proposal to give further financial assistance to small business enterprises. Within the next week or 10 days, the administration plans to ask Congress to provide government-insured loans, accompanied by tax incentives, to small companies in need of operating or equity capital.

This will be about the extent of the government action to stimulate business investment at this session of Congress.

No Tax Reform — Administration officials and congressmen recognize the need for tax revisions to bring out venture capital for industrial enterprises. But they will not support such tax reform now. The reason: Such revisions would reduce federal income and increase the deficit.

The administration already is embarrassed by the size of its deficits in a time of high economic activity. Administration advisers warn that the government may want to increase its spending this summer to combat unemployment if the trend continues.

The loans to small business plan will be a gesture toward helping business and toward fulfilling the President's promises to aid small enterprise. It may help divert attention from the government's failure to provide business tax reforms, administration advisers believe.

Basically, the administration's proposal will embrace the capital bank idea of Senator O'Mahoney (STEEL, Feb. 13, p. 60). It will offer loans of up to $15,000 for periods up to 5 years, and loans of more than $15,000 for equity financing for longer periods.

Use Private Capital — The loans would be made through a chain of banks set up with private capital. The incentive to attract capital for the banks would be provided by making the income of the small businesses receiving loans exempt from federal income taxes for the first 15 years. The government would determine which businesses would qualify for such loans.

Participating banks would be able to insure the loans up to 95 per cent of their face value under a government setup similar to that of Title I of the National Housing Act under which the Federal Housing Administration guarantees loans on homes.

Tax Revision? Not Now

LOWER federal tax levies, special attention to just depreciation allowances and other reforms in the federal revenue structure to stimulate business and investment are given a nod of approval by the investment panel of the Joint Committee on the Economic Report.

But the subcommittee makes no specific recommendations for lower business tax rates. Members concede that there is little chance of such action being taken at this session of Congress.

The report is based on hearings held last fall on business investment problems.

The War Is Over—The present tax system, the group says, was largely devised to meet the special fiscal needs of depression and wartime. What is now needed, it admits, is a tax system geared to "increased production" and to the development of small business and equity financing.

The report is considered significant in that it reflects the belief of congressmen that business taxes should be lowered.

Green light for little fellow

The report bears the signatures of Sen. Joseph C. O'Mahoney (Dem., Wyo.), Sen. Paul Douglas (Dem., Ill.) and Rep. Wright Patman (Dem., Tex.). The two Republican members, Sen. Robert Taft of Ohio and Rep. C. A. Herter of Massachusetts, didn't sign the document but issued a supplemental statement. They agreed tax reform was necessary but said they could not go along with the majority report. Particularly they differed with the majority report on the matter of double taxation of dividends on which the majority recommended no corrective action.

What's Needed—The report suggests: Greater freedom for businessmen to take tax deductions for depreciation of equipment; liberalization of provisions for carrying forward net losses; revision of Section 102 of the Revenue Code providing penalties for accumulation of surpluses; steps to mitigate the liquidation problems of family-owned businesses in event of death of the principal family stockholders.

Control Steel Prices?

A LARGE measure of control over steel prices is proposed in the majority report of the Joint Committee on the Economic Report, just issued.

As forecast in STEEL (Mar. 13, p. 65) the committee's majority calls for:

1. Systematic studies by the Federal Trade Commission of prices, output costs and profits of each of major steel producers and keeping this information currently available for use by Congress; 2. notification to FTC by steel companies of contemplated increases in prices and cooling-off period of 30 days before increase becomes effective to enable commission to investigate and hold hearings and make public the underlying facts; 3. further study by the committee of means whereby a greater degree of competition within the steel industry may be achieved; and 4. a study to determine whether that industry should receive public utility treatment from the government.

Shades of Judge Gary—The majority report, signed by Senators O'Mahoney, Myers, Sparkman and Douglas and Representatives Hart, Patman, Huber and Buchanan, gives weight to the historic testimony of Elbert H. Gary, chairman, United

States Steel Corp., before the Stanley Committee in 1911. Then Judge Gary spoke of need of protecting the public against imposition or oppression as the possible result of great aggregations of capital.

Judge Gary testified: "I believe we must come to enforced publicity and governmental control even as to prices. . . I would be very glad if we knew exactly where we stand, if we could be freed from danger, trouble, and criticism by the public, and if we had some place where we could go, to a responsible governmental authority, and say to them, 'Here are our facts and figures, here is our property, here our cost of production; now you tell us what we have the right to do and what prices we have the right to charge'."

Faulty Economics — The minority report, signed by Senators Taft, Flanders and Watkins and Representatives Wolcott, Rich and Herter, says the majority report "instead of being an impartial appraisal is rather a bill of complaint with a faulty economic brief."

Minority members say "the fact that companies make larger profits in times of abnormal demand does not seem to us subject to criticism, and perhaps is even necessary to stimulate the construction of additional facilities, as well as keep in operation needed marginal or high-cost facilities to supply peak demands."

They hold "with regard to the new pension contracts, there can be no doubt that the increased cost to the steel companies will, under a competitive system or a noncompetitive system, be reflected in higher steel prices in the long run. Based on the evidence presented we are inclined to think that the recent increases reflect substantially the increased costs of the pensions granted."

Very Little Agreement—The minority disagreed with all the majority recommendations excepting that further study is necessary to determine whether "competition is effective in the steel industry and if it is not, how it can be made more effective."

In an individual supplementary statement Senator Flanders objected to the majority assumption that steel companies should not lay aside reserves for replacements at replacement costs and pointed out that it always has been the custom of American industry to pay not only for replacements but also for expansion out of profits.

Senator Flanders added: "I believe that the steel companies, particularly their leaders, have deplorable public relations and that many of their decisions are shortsighted."

MEN, MAIDS, MACHINES: They all make possible the manufacture of Eterna-Matic watches, made by Eterna Watch Co. of America, New York, and Grenchen, Switzerland. Part of Eterna's tool room equipment at Grenchen is this $30,000 master machine that will work to accuracies of less than .0001 inch

Product Emphasis Shifts

HOW producers shift emphasis on products in response to changes in market conditions is graphically shown in a report by Jones & Laughlin Steel Corp., Pittsburgh.

Fifteen years ago only 1 per cent of that company's shipments consisted of hot-rolled and cold-rolled sheet and strip. Today those products make up 40 per cent.

Also getting increased attention are tubular products. Tin mill products continue to rank as importantly as they did 15 years ago.

Products declining in importance percentagewise in J & L's production and shipments are wire products, hot-rolled and cold-finished bars, plates, structural shapes, and miscellaneous.

Commenting on the channeling of an increasing portion of its steel into sheets, tubular products and tin plate, J & L points out that "these, for the most part, are used in the manufacture of consumer goods and should tend to keep our business steadier during changes in business."

Product distribution changes follow:

	1949 %	1948 %	1939 %	1935 %
Hot-rolled and cold-rolled sheet and strip	40	37	22	1
Tubular products	20	17	18	15
Tin mill products	8	9	7	8
Wire products	5	5	7	8
Hot-rolled and cold-rolled bars	16	18	21	24
Plates and structural shapes	8	10	7	16
Miscellaneous	3	4	18	28
Totals	100	100	100	100

Tool Exports Climb

Machine tool shipments abroad in 1949 total $77.9 million. Marshall Plan helps

MACHINE tool exports increased in 1949 from 1948—thanks to ECA aid—but foreign shipments are still far under the big 1947 total.

Among Marshall Plan nations, only Great Britain's machine tool orders dropped markedly. Italy recorded spectacular gains. Orders from all British Commonwealth countries except Canada dropped sharply in 1949.

Department of Commerce tabulations show these dollar values of machine tool exports since the war: 1949, $77,927,606; 1948, $72,068,549; 1947, $118,829,723; 1946 (when postwar export business was getting started), $20,564,687.

Comparisons of machine tool exports between 1949 and 1948 for 11 major countries are:

	1949	1948
Italy	$13,142,918	$2,633,160
France	9,480,537	6,915,008
Canada	9,104,202	8,557,493
U. K.	8,614,124	10,324,424
Austria	3,710,917	1,276,737
Netherlands	3,404,559	3,995,939
Switzerland	2,769,844	3,506,156
Sweden	2,569,038	2,274,450
W. Germany	2,456,059	36,647
Belux	2,180,869	2,704,380
Brazil	2,077,471	2,104,091

They'll Build Their Own Mill

New England may have to build its steel mill without the help of established companies.

"We had hoped, and we still hope," says Dr. Alfred C. Neal, vice president of the Federal Reserve Bank of Boston and economic adviser to the New England Council's steel committee, "that an existing steel company would come into the venture and average out the cost of the new construction with that of its old plants." Steel companies approached on the matter have declared the proposal uneconomic.

On the assumption that no established companies will participate, says Dr. Neal, New England can offset today's high construction costs in part by low cost of raw materials, by an efficient new mill, by cheaper financing and by getting a little better price for steel than existing mills by virtue of location.

Dr. Neal says he's confident that a method of financing the mill, which would cost about $250 million, can be devised. William H. Colvin Jr., president of Crucible Steel Co. of America, emphasizes that this outlay at today's costs will produce no more than $80 million worth of steel facilities at the value of similar assets now owned and in operation by established companies.

GM Prepares for Union Trouble

Suppliers warned of possible suspension when wage contract runs out in May. Corporation to resist union shop, economic demands . . . Nash-Kelvinator signs

REPORTS are circulating in Detroit that General Motors Corp. is advising some of its suppliers to prepare for a 60-day suspension following termination of the present GM-union contract at the end of May.

Economic demands totaling 31 cents an hour plus insistence on a union shop clause are concessions many believe GM will resist. If the UAW makes good its threat to strike over the union shop issue, a walkout this summer is probable.

Agreement between Nash-Kelvinator Corp. and the UAW-CIO on a funded pension and insurance program nudges the auto industry further down the road toward the union's social benefits goal.

Ten Cents an Hour — The plan covers 20,000 Nash-Kelvinator employees belonging to the UAW in plants at Kenosha and Milwaukee, Wis., Grand Rapids, Mich., and El Segundo, Calif., plus an additional 5000-6000 employees represented by other unions in these plants. The company will pay 7 cents an hour per employee to cover pensions, for the life of the agreement, which is five years from July 1, 1950, regardless of any change in federal social security benefits. In addition 0.4 cent per hour will be paid for administration of the pension fund, and 2.6 cents per hour toward life insurance, disability, sickness and accident benefits.

Pensions of $100 per month will be paid to workers retiring at age 65 with 25 years of service. They may continue to work up to age 68 and future service credits accumulate up to age 68. Past credits are based on seniority or on actual service with the company if that is greater than seniority accumulated since 1934. A board of administration, comprising two representatives each from the company and union, plus an impartial chairman, has full jurisdiction over the administration of the fund and will obtain every year an actuarial evaluation of receipts and disbursements. Each plant will have a four-man joint pension committee of union and management appointees.

Benefits—Life insurance and disability benefits under the contributory program will range from $2000 to $4000 per year, with an average of $3154. Weekly sickness and accident benefits range from $18 to $36.

If new federal social security legislation is enacted, increasing old-age benefits, the company and union will set up a joint committee, not sooner than July 1, 1952, to study effect of the legislation on the pension fund and to determine, among other things, whether it is then possible to provide benefits to workers separated from employment prior to age 65.

SCHOOL'S OUT: From school days in Hoganas, Sweden, to the ranks of retired employees of Norton Co, Worcester, Mass., these six men have spent all their lives together. All are long-service men with Norton, the oldest 47 years. Their total service is 240 years

Ford, Union Iron Out Wrinkles

A "memorandum of agreement" on retirement, health and security programs has been signed by the UAW-CIO and Ford, ending weeks of dispute over how pension fund payments shall be made by the company.

It is stipulated that beginning as of Mar. 1, the company payments shall be 8¾ cents per hour per employee, but that since the company assumes the responsibility for contributions to the fund "from time to time" to provide the monthly benefits specified, "it may vary these payments accordingly." Changes in federal social security benefits also will permit the company to revise its contributions, in line with actuarial estimates. Past service benefits will be funded as the company in its sole discretion may determine.

Chrysler Dealer Protests

As the Chrysler strike wore on to its ninth week, there were hints of a speed-up and streamlining of daily negotiations. The Nash and Ford agreements were believed to place additional pressure on Chrysler for funded pensions. Meanwhile, a De Soto-Plymouth dealer in Dallas, Tex., took a full-page ad in *Automotive News*, asked all Chrysler dealers to join in an organization to demand that investments and interests of employees be recognized. He suggested each dealer contribute $1 per employee into a financial "war chest," and urged that even if the Chrysler strike should end suddenly the plans go ahead so that organized dealers would be "ready for another strike which will inevitably occur."

Complete Pension Study Asked

The New York Life Insurance Co. wants a comprehensive study of the pensions problem by an impartial commission of government, management, labor and public representatives. The recommendation was made in the company's annual report to policyholders.

"Pensions, whether provided by government or private industry, deserve thorough discussion and public debate," says New York Life. "Their impact upon our economy and society, who will pay for them and how the cost will be met are important considerations."

Spotlight on Cold Extrusion

PMI speakers say experimental work on technique shows promising commercial possibilities

PREVIEW of a cost-saving attraction coming to the metalworking industry's stage—cold extrusion—was shown at the Pressed Metal Institute's Cleveland symposium on the new production technique.

Experimental work reveals that a scrap loss of only 1 pound is experienced in manufacture of 105 mm shells by cold extrusion. Conventional production methods result in 6 to 20-pound scrap losses, says Col. Merle H. Davis, chief, Industrial Division, Army Ordnance, who spoke at the meeting. Other economies come through reduction in machining operations so they can be done in one setup. Low carbon, low manganese steel can be used; cold working will produce the necessary physical properties. Cold extrusion also results in a superior surface finish and greater concentricity, says Colonel Davis.

Swords to Plowshares—Since developmental work at Heintz Mfg. Co., Philadelphia, is being conducted under an Army Ordnance contract, the products developed are along military lines. Most of the work thus far has been on projectiles and cartridge cases, but savings and improvements that showed up in the experimental work indicate that exploration of commercial possibilities is worthwhile.

Work on cold extrusion of steel has benefited conventional drawing techniques. Phosphate coatings used in cold extrusion mean lower scrap and better work when used on some of the more difficult deep-drawing operations.

The finished products have been turned out faster without scoring or pickup and without frequent stops to stone dies.

Others in the Act—Other companies doing cold extrusion work for the Defense Department include: Stoner Mfg. Corp., Aurora, Ill., making 20 mm cartridge cases; Metroloy Corp., New Rochelle, N. Y., making an experimental 60 mm mortar shell; Mullins Mfg. Co., Salem, O., making an experimental 4.5 in. experimental rocket motor and head in one piece; Norris Stamping & Mfg. Co., Los Angeles, using cold extrusion techniques for making the cup of the Navy's 3 in. 50 caliber cartridge case; and National Machinery Co., Tiffin, O., working with Frankford Arsenal in developing the optimum method of fabricating .50 caliber machine gun cartridge cases.

Several hundred PMI members ranging from operators of small shops to engineers from automotive companies attended the symposium.

AIME Groups Meet

Iron ore resources, utilization of low-grade ores, coal handling techniques, maintenance of coke ovens and overall blast furnace operations are among the subjects to be discussed at the 33rd annual conference of the National Open Hearth Steel Committee and the Blast Furnace, Coke Oven and Raw Materials Committee of the American Institute of Mining & Metallurgical Engineers. The conference will be held Apr. 10-12 at the Netherlands Plaza Hotel, Cincinnati. Included in the program is an inspection trip of the Armco Steel Corp. plant at Middletown, O.

Provided Safety Plan

The safety program for Unit Drop Forge Division, Fuller Mfg. Co., described in STEEL ("What's Safety Worth in Dollars and Cents," Mar. 6, p. 57) was provided by Charles Elsby, safety engineer for the Employers Mutuals of Wausau, Wausau, Wis. Employers Mutuals is the insurance carrier for Unit Drop Forge and worked closely with company officials in organizing the safety plan which cut accident frequency from 50.7 in 1945 to 1.6 in 1948.

Founders Start Safety Program

Gray Iron Founders' Society Inc., Cleveland, wants your help in a safety campaign.

The society is amassing a library of information on foundry equipment and devices that have been specially designed to incorporate safety features. The information will be made available to all foundry management executives who are interested in solving specific safety problems. Members of Foundry Equipment Manufacturers have been invited to contribute to such a library. All other producers of equipment and devices having foundry application are invited to submit full data regarding their products.

Data should include gloss photographs of the unit or device, a schedule of prices, a clear description of the safety feature or features and—but incidentally—any other factors dealing with efficiency and low maintenance.

Society headquarters are at 210 National City-E. Sixth Bldg., Cleveland 14.

Steel Men Meet in Pittsburgh

Three steel executives from the Pittsburgh district will tell area iron and steel men of some of the problems facing the industry's technologists at the Apr. 3 meeting of the Pittsburgh section of American Institute of Mining & Metallurgical Engineers, at the Mellon Institute auditorium.

Speakers are: H. W. Graham, vice president and director of technology, Jones & Laughlin Steel Corp.; Dr. E. G. Hill, director of metallurgy and research, Wheeling Steel Corp.; and Dr. E. C. Bain, vice president, research and development, Carnegie-Illinois Steel Corp.

Electric Show Scheduled

More than 50 exhibits of new and improved electrical equipment and supplies designed for high efficiencies and lower costs will be on display at the Mid-Century Electrical Equipment Show at Cleveland's Masonic Temple Mar. 28-30. The affair is sponsored by the Electrical League of Cleveland and Cleveland Electric Illuminating Co.

Meeting Set on Oil Reclaiming

Cost-saving possibilities for industry will be among the factors discussed in a symposium on oil reclaiming at the annual convention of the American Society of Lubrication Engineers, Hotel Statler, Detroit, Apr. 10-12.

Reserve Space for Steel Show

Over 100 firms—suppliers of steel industry equipment and services—have already reserved space for the 1950 Iron & Steel Exposition.

To be held Sept. 26-29 in conjunction with the annual convention of the Association of Iron & Steel Engineers at Cleveland's Public Auditorium, the exposition serves the engineering, operating and maintenance supervisory personnel of the iron and steel and allied industries.

The AISE technical program, which will also be held in the Public Auditorium, will include about 40 papers on phases of steel mill engineering, operation and maintenance.

Soss Gets Safety Award

Soss Mfg. Co., Detroit, manufacturer of hinges for automobiles, furniture and general building purposes, was awarded a certificate of merit for an outstanding accident prevention record. It achieved a total of 250,007 man-hours of production from August, 1949, to December, 1949, with no lost-time accidents.

New Plants for Timken

Expected cost of two new roller bearing manufacturing plants at Bucyrus is over $4 million

TIMKEN Roller Bearing Co. will build two new roller bearing manufacturing plants at Bucyrus, O., expected to cost about $4,250,000.

The company has taken an option to purchase 84 acres about two miles from the center of Bucyrus for the site of the new units. First of the two plants, which will manufacture the most popular sizes of tapered roller bearings used in autos, tractors, farm equipment and conveyors, is expected to be completed about Nov. 1. This plant of about 55,000 square feet will cost an estimated $2 million.

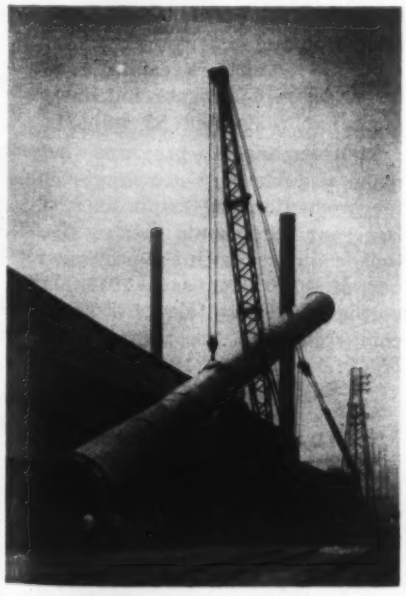
The second unit of 65,000 square feet will be constructed after the first is completed, and will cost an estimated $2,250,000.

Borg-Warner Division To Move

All operations of the Marvel-Schebler Carburetor Division of Borg-Warner Corp., now in Flint, Mich., will be transferred to Decatur, Ill., in late summer or early fall of 1950.

Marvel-Schebler Carburetor will be housed in a 135,000-sq ft plant that Borg-Warner leased from Mueller Co. in May, 1948. Improvements and alterations of the factory and surrounding grounds, including construction of an engineering laboratory, probably will be started before spring. Physical limitations of the Flint plant, which made expansion impossible, dictated the move. Negotiations are in progress to sell the Flint facility to E. I. du Pont de Nemours & Co.

Marvel-Schebler makes carburetors for agricultural and other equipment.



GOING UP! A new steel furnace stack, weighing 26 tons, is raised into position upon its base at Bethlehem Pacific's Los Angeles plant. Rising 150 feet above the ground, the stack will service the new billet heating furnace—part of the modernization of the plant's 12-inch rolling mill

Love Buys Merz Engineering

Physical assets of Merz Engineering Co., subsidiary of Marmon-Herington Co. Inc., Indianapolis, Ind., were sold to Love Machine & Tool Corp., same city. Purchase included the Merz plant and its equipment.

The new owner plans to operate the plant for the time being with its present personnel. Merz has 100 employees, Love 40. The Merz plant, immediately south of Marmon-Herington, was built just before the war; it has a 33,000 sq ft area. Love has 6500 sq ft of manufacturing space.

Dravo Buys Ohio Pipe Plant

Dravo Corp. has purchased a large pipe fabricating plant at Marietta, O., from International Derrick Co.

The property consists of two manufacturing buildings, storage yards and an office. It has 93,000 sq ft of manufacturing space. Dravo's Machinery Division will begin operating the plant after equipment is purchased and installed.

American Can Co. Expands

American Can Co. has contracted to purchase a building and property from Purolator Products Inc. in Newark, N. J.

The new property will permit expansion of American Can's Newark machine shops which employ about 1100. There the company designs and produces can manufacturing machinery for its own factories, as well as machinery used in canning and packaging plants for final sealing of containers.

Wheeling To Install Equipment

Wheeling Steel Corp. will install new electrolytic tin-coating equipment at its Yorkville, O., works at an estimated cost of between $3 million and $4 million.

Work will begin on the new unit "at an early date," says a company announcement. The equipment is expected to be in production early in 1951. Wheeling also makes tin plate by the hot-dipped coating process at its Yorkville works.

Shell Plans Gasoline Plant

Shell Oil Co. will begin construction immediately on a large gasoline extraction plant in the Elk City field in Beckham and Washita counties, Oklahoma.

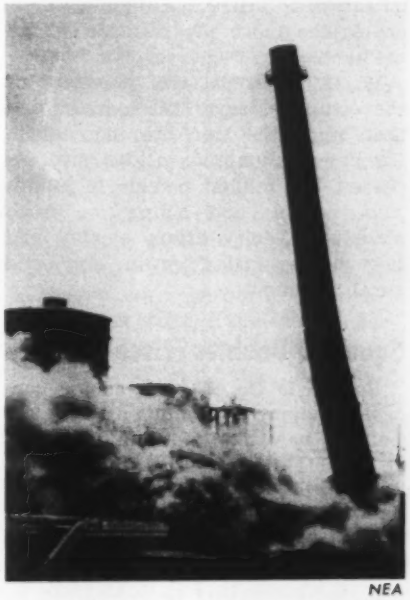
The new Shell plant when completed will handle about 100 million cubic feet of gas daily and will be designed to permit adaption of facilities to provide cycling, repressuring and crude oil stabilization.

The completion by Shell of a discovery well in November, 1947, opened one of the larger oil fields in the mid-continent area. Total investment of Shell and other companies in the field is expected to exceed $32 million by the end of this year. Shell, already operating 17 rigs in the field, anticipates drilling about 50 more wells in 1950 at a cost of $10 million.

New Press Department Started

To bring under its own control the forming of metal parts that were produced outside the company, Nineteen Hundred Corp., St. Joseph, Mich., builder of home laundry equipment, established a new press department.

Seven new hydraulic presses, built by Hydraulic Press Mfg. Co., Mt. Gilead, O., were installed to handle the deep draw operations. The results, the company finds, are a better production flow, reduced down-time, fewer rejects and better quality control.



NEA

COMING DOWN! At Waltenstadt, Salzgitter, Germany, the chimney of the Hermann Goering Steel Works topples after being blasted during dismantling activities carried out in the British zone despite protests by German workers. An explosive charge at the chimney's base did the trick

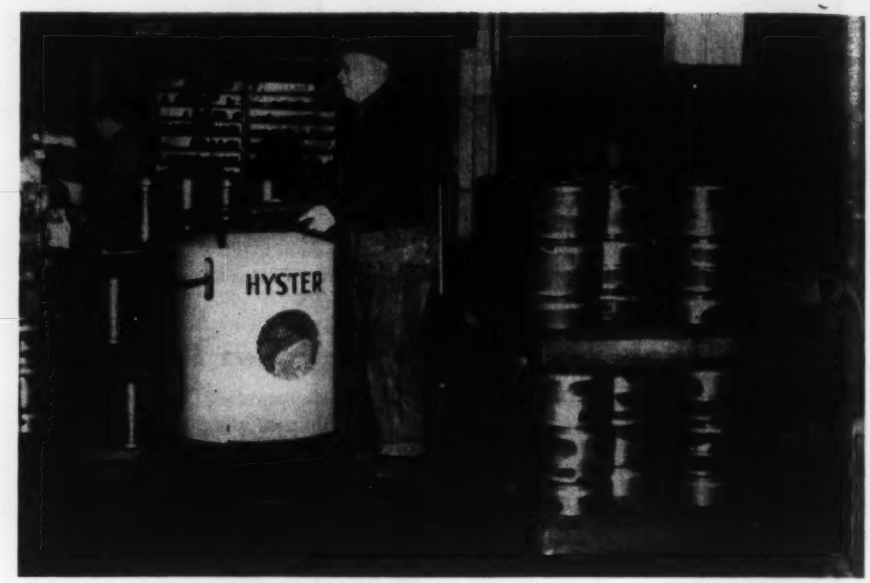
Hyster Buys Trucks

Company now manufacturing Salsbury Turret Trucks at Danville plant.

TURRET trucks formerly produced by Salsbury Corp., Los Angeles, have been taken over by Hyster Co. of Portland, Oreg., Peoria and Danville, Ill. Ernest G. Swigert, president, says Hyster will manufacture and sell the turret trucks.

Now manufactured at Hyster's Danville plant, the new line will be known as Hyster Salsbury Turret Trucks and will be sold and serviced by 168 distributors in principal cities throughout the world.

Acquisition of the five Salsbury horizontal materials handling trucks —pallet truck, tug, platform truck, cargo truck and auto-loader—rounds out the previous Hyster line of four fork lift trucks ranging in capacity from 2000 to 15,000 pounds, a 10,000-pound mobile crane and two straddle trucks of 18,000 and 30,000-pound capacity. The Hyster Salsbury Turret Trucks are described in an eight-page catalog just released.



SALSBURY TURRET TRUCKS
. . . manufactured and sold now by Hyster

Reynolds Starts Farm Institute

To find more effective use of aluminum, Reynolds Metals Co. founded the Reynolds Farm Institute. The institute has headquarters in Louisville. It has started on research into the many new uses of aluminum on farms, to instruct and guide farmers in the most effective use of the metal.

W. G. Reynolds, vice president of the company, says: "It is estimated that since the war the increase in the use of aluminum on the farm exceeded 700 million pounds in aluminum roofing and siding for farm structures—dairy barns, poultry and hog houses, silos, grain bins and rural housing."

Square D Doubles Frisco Plant

Square D Co., Detroit, motor control equipment manufacturer, will build a new plant in San Francisco to double its facilities there. The one-story structure will have 35,000 sq ft of manufacturing space. Its cost, including the site, will total $250,000. Work will start in three months and should be completed by the end of the year.

Sheaffer Pen Expands

W. A. Sheaffer Pen Co. will begin work immediately on a new $2.5 million plant at Ft. Madison, Iowa. Operations being carried on in three plants in Ft. Madison will be consolidated into the new unit which will also provide additional office space. The plant will be constructed by Austin Co.

Kaiser Builds Soaking Pits

Kaiser Steel Corp. is building two new soaking pits at its Fontana, Calif., mill. When these are completed, Kaiser will have 16 pits. The work will complete the $35 million expansion program now underway at Fontana, designed to raise finished steel production 11 per cent.

Ward Sells Third Warehouse

A third steel warehouse was sold by Edgar T. Ward's Sons Co. and its affiliates, Columbia Steel & Shafting Co. and Summerill Tubing Co.

E. L. Parker, president of Ward, announced sale of the assets of the Ward warehouse in Syracuse, N. Y., to Peter A. Frasse & Co. Inc. Columbia Steel & Shafting sold a Ward warehouse in Buffalo to Service Steel Co., Detroit, several weeks ago (STEEL, Mar. 6, p. 55) and the Ward Milwaukee warehouse to Central Steel & Wire Co., Chicago (STEEL, Feb. 6, p. 59).

As was the case in the sale of the Milwaukee and Buffalo warehouses, the Syracuse warehouse was sold because of unfavorable freight rates in their territories. Peter A. Frasse, buyer of the Syracuse warehouse, has warehouses in Syracuse, Buffalo, New York, Jersey City, N. J., and Philadelphia. Operations of the acquired Ward interest in Syracuse will be integrated with the present Frasse activities in that city.

Interests of Columbia Steel & Shafting and Summerill Tubing will be served by J. Gill Stanley, district manager of sales, who has offices in Buffalo.

Tinning Line Nears Completion

Expansion of Granite City Steel Co.'s electrolytic tinning line at Granite City, Ill., is scheduled for completion by the end of this month. This expansion, costing approximately $500,000, will virtually double the line's tinning capacity. This project is part of the company's broad modernization and expansion program. In 1949 the company's capital expenditures for replacements and improvements approximated $2 million.

The expansion program helped make possible new company records for production and shipment of steel last year. Shipments totaled 464,000 tons, compared with the previous record of 409,000 tons in 1948. Ingot output in 1949 totaled 532,000 tons, compared with the previous record of 494,000 tons in 1948.

Ford To Buy More on Coast

Ford Motor Co. plans to increase its purchases of West Coast materials and manufactures to $60 million this year compared with $55 million in 1949. The company steadily has been increasing its regional buying of parts for its West Coast assembly plants, and the program is expected to be extended in the future. Among new purchases this year will be $3.5 million worth of radiators from Modine Mfg. Co.'s new plant at Whittier, Calif.

Railroads Favored

Westinghouse will ship by rail instead of by truck whenever rates, services are comparable

WESTINGHOUSE Electric Corp. will ship by rail instead of by truck whenever rates and services are comparable.

Andrew H. Phelps, vice president in charge of purchases and traffic, announced the "support-the-railroads" policy at an address before the Western Railway Club in Chicago. Westinghouse last year spent more than $40 million to freight its goods.

Truck Subsidies — Mr. Phelps charges that "over-the-road" commercial carriers have unfair advantage over railroads because of what amounts to government subsidies in tax-supported highway construction. "Truck service can ruin but not replace rail service," he says. The Westinghouse argument is that a company of its size and diverse activities cannot afford to contribute to the railroads' collapse and thus lose the "universal, indispensable, all-around rail service" and be forced to rely on "highly restricted and specialized truck service."

Railroads are to be used for all Westinghouse shipments unless trucks offer important advantages in service or lower rates. Whenever truck rates are lower than rail rates, the railroads are to be given the chance to make adjustments that will enable the company to ship by rail at competitive rates.

Truck Highways—"The operation of large trucks," says Mr. Phelps, "should be barred except on highways designed to sustain their weight. They should pay fees which would compensate for the increased cost of constructing such highways over and above the cost if designed for ordinary vehicles.

"If the truckers can't afford it, then the obvious answer is that the service now rendered lacks economic justification."

SP Orders 36 More Diesels

Southern Pacific Railroad has placed orders for $17.5 million worth of additional diesels. It now has 406 in service.

Of the 36 locomotives ordered, 24 will be of 6000 horsepower each and 12 of 1500 horsepower each. Deliveries will start in July and be completed by yearend. Of the 24 large diesels, 22 will be built by Electro-Motive Division of General Motors Corp. for freight service and two by American Locomotive Co. for passenger service. Baldwin Locomotive Works will supply the 12 other diesels for freight service. These orders raise Southern Pacific's postwar outlays for new cars and engines to more than $275 million.

Railroads Held at Disadvantage

The railroads "labor under staggering burdens and discriminations," says S. M. Felton, president of the American Railway Car Institute.

"Today the railroads stand alone as the only form of public transportation which is not subsidized in one way or another. Other forms of transportation use highways, waterways and airports built and maintained by the people's taxes, including taxes paid by the railroads," says Mr. Felton.

"The railroads are burdened with regulations imposed years ago when they were supposed to have a near-monopoly on mass transportation. These regulations still stand, despite the fact that the transportation industry is now one of the most competitive in the country."

T & P To Get More Diesels

Texas & Pacific Railway Co., Dallas, directors approved purchase of 13 more diesel-electric locomotives to cost about $3.5 million. The new order will consist of two 4500-hp units, six 3000-hp units, one 1500-hp road service engine and four 1000-hp switchers.

More Freight Hauled by Truck

The volume of intercity freight hauled by Class I motor carriers in the fourth quarter of 1949 increased 3.4 per cent over that carried in the same period of 1948. There were increases of 2.9 per cent in the first quarter, 3.4 per cent in the second quarter and 6.7 per cent in the third quarter of the year, compared to the same quarters in 1948.

Reports covering the operations of 1434 Class I intercity common and contract carriers indicate that they hauled an aggregate of 35,222,315 tons in the fourth quarter of 1949, compared to 34,068,562 tons in the same period last year.

Truck-Rail Co-operation Planned

A plan to co-ordinate truck and rail shipments to get the best efficiency of both forms of transportation has been worked out by J. Phil Fellabaum, president of Aetna Freight Lines, Warren, O. He has applied for patents on the idea.

Mr. Fellabaum says centers could be established in certain strategic spots. Trucks would deliver or pick up merchandise in these areas, delivering or receiving the materials at railroad stations. Railroads would handle the shipment between various centers. Mr. Fellabaum points out that railroads are more efficient for long hauls, the trucks for short hauls. Special truck beds would be used.

More Roads Needed

So says road builders group that wants the U. S. to spend $1 billion yearly on highways

DOUBLING of current and proposed federal aid for highways to $1 billion a year is recommended to the House Committee on Public Works by American Road Builders' Association.

The association supports the bill authored by Will M. Whittington (Dem., Mass.) providing for $500 million a year in federal aid to roads, but thinks the proposed measure doesn't go far enough. ARBA says that present deficiencies in highways have been caused by neglect of the problem and the up-trend in vehicle use. The condition of the roads brings damage to the economy and excessive road maintenance costs, ARBA adds.

Increases Recommended—The association recommends these increases in the Whittington proposals:

$333 million in federal aid a year for the primary highway system, instead of the $225 million proposed in the bill. Primary roads are part of a national system of highways.

$224 million aid a year for projects on the secondary system, instead of the proposed $150 million. Secondary roads are within states.

$184 million a year for urban area routes instead of the proposed $125 million.

$259 million a year for the interstate system, instead of the proposed $70 million, with the states called upon to put up one-fourth as much, instead of matching the federal portion dollar-for-dollar, as is the case in present federal aid. Interstate roads are major highways going from state to state but which are not part of a national system. Bureau of Public Roads estimates that it would cost $11 billion to make them modern.

More Vehicles — "A construction program is needed which will parallel the uptrend in vehicle use as it did during the 1920s," says Charles M. Upham, of ARBA. "The rate of vehicle increase in the four-year period since the war is double that of the 1920s, yet highway mileage built is probably at a rate of about half the 500,000 miles built during the 1920s."

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

Three different motor pools on little Kwajalein pointed up an example of what standardization of equipment means to the armed services during wartime

PRODUCT STANDARDIZATION would have made the job of logistics during the war far less burdensome than it was.

Transportation on the small island of Kwajalein is a good case in point: When U. S. forces took it from the Japanese, three services established posts there. Each had its own fleet of motor vehicles—the Navy, the Army and the Marine Corps air arm. Each had its own stock of spare parts —about three times as much as would have been necessary if only one vehicle had been adopted as standard for the island. The same situation existed for other types of equipment wherever American forces were thrown together.

Staggering Complexity—When the Munitions Board tackled the matter of standardization after the war, it was staggered by the complexity of the problem. The problem was far more difficult than at first supposed. Two obstacles stood in the path of achieving the goal of maximum interchangeability of parts: One: Standardization of items used in large numbers by military and civilians would have to be acceptable to all parties because of competitive considerations involved. Two: Standardization had to be based on currently available tools and facilities in the producing industries that made the equipment, and any program requiring extensive retooling would be excessively costly, paralyzing for a long time many of the plants in the industry and reduce available capacity.

The standardization problem is confronted only in products whose principal use is by civilians and which are bought in large quantities by the military in wartime. Standardization does not apply to purely military items; they can be standardized to any degree by the interested service.

Guinea Pig—Looking at all the angles, the Munitions Board decided to select one industry as a guinea pig for its research into standardization. The industry chosen was the one that manufactured internal combustion engines for marine, automotive and general industrial purposes.

MB officials spent many months going over the ground in a preliminary way. In April, 1949, the board created an Industry Advisory Committee for Internal Combustion Engines. C. E. Nelson Jr. of Waukesha Motor Co., Waukesha, Wis., was chairman.

The story of what the committee has been able to accomplish in a year emphasizes the difficulty of the project: So far the committee has gone only a little way toward maximum interchangeability of parts.

The first major action of the committee is the filing of a recommendation that the Defense Department canvass the whole industry to find out which engines that do have maximum interchangeability of fast-wearing parts can be produced on the industry's present major machine tools.

The next order of business would be for the Defense Department—after it has completed a survey—to approach the industry on a program of actually producing engines incorporating maximum interchangeability of fast-wearing parts.

The industry advisory committee noted in its recommendation that its preliminary investigations indicated a considerable degree of interchangeability of fast-wearing parts may be feasible but that big problems would be involved because the bulk of the engines in any large procurement program would have to be obtained by buying currently produced engines.

Industry Co-operation — Recognizing the need of providing for the production of special-type engines to meet special needs, the committee recommended a policy under which the industry would co-operate to make the engines adaptable to existing production facilities—so they could actually be produced. The committee was agreed that much could be accomplished in simplification and standardization of accessory items—fuel pumps, spark plugs, electrical systems, bases, etc. But committee members believed that the accessory-items phase of the program should not be worked up until the problem of interchangeability of parts was whipped.

Experienced now in the ramifications of standardization in internal combustion engines, the Munitions Board is moving slowly on other civilian products that might be standardized for interchangeability.

Defense Department

NEW CHAIRMAN: William Webster (left) is congratulated by Defense Secretary Louis Johnson who administered the oath of office to him as the new chairman of the Research & Development Board. Mr. Webster, executive vice president of New England Electric System, Boston, since 1942, brings to his new post experience in government, military and civil affairs. His first association was with the board upon its inception in 1946 as the Joint Research and Development Board when he served as consultant. Since October, 1949, he has been consultant to the office of the defense secretary and the Atomic Energy Commission

Standardization Activities

Co-ordination of standardization activities that the federal govern-

ment is interested in has been assigned to a newly created Interdepartmental Standards Council; chairman is A. P. Kaidanovsky, Federal Supply Service, General Services Administration, Washington; 15 federal agencies are represented. Interesting subject matter is in the field of international as well as national standardization.

To Build Magnetic Materials Lab

Navy's Bureau of Ordnance will erect and equip a large new Magnetic Materials Laboratory at White Oak, Md. Ordnance men believe use of magnetic controls is just beginning; they think a big program of development must be carried out to derive greater benefits from magnetic controls for military and civilian purposes.

Structural steel has already been delivered and the contract is about to be let for the laboratory. The new building should be ready for full operation before the end of 1951; it will contain much special machinery and equipment. Work on magnetic materials will continue in the meantime at the Naval Gun Factory.

1948 Minerals Book Held Up

Although the Bureau of Mines completed work on its 1948 Minerals Yearbook, you won't be able to get copies of it until next January or February.

Why? It seems that the printer will not be able to put it through the presses until then. But the Superintendent of Documents, U. S. Government Printing Office, has just brought out the Bureau of Mines Minerals Yearbook of 1947. So, if you need 1948 figures, you must write to the Bureau of Mines or wait patiently until next year.

Many Tips from DuPont Patents

Many discoveries of interest to the metals industries are included among 731 patents of the E. I. duPont de Nemours Co., listed in the Mar. 7 and 14 issues of the Patent Office's Official Gazette. They are under the title "Register of Patents Available for Licensing or Sale."

They cover such operations as degreasing of iron and aluminum, removal of impurities from plating baths, processing of titanium ores, cooling of internal combustion engines, production and use of various titanium derivatives, methods for purifying petroleum products, coating by the flame-spraying process, application of baked coatings to metals, injection molding of plastics, and many other operations.

Watch Declassified AEC Patents

Manufacturers should watch the patents being declassified by Atomic Energy Commission and made available on a nonexclusive, royalty-free basis.

They can get the lists by writing the commission's Document Sales Agency, Box 62, Oak Ridge, Tenn. A batch of 69 now offered, for example, includes one covering a new method of surface hardening iron, steel, cobalt, nickel, etc. Issued by the Patent Office Jan. 10, 1950, as No. 2,494,267, it embraces boriding to produce a surface "which is very abrasion resistant and quite corrosion resistant".

These are some other interesting titles: "High Melting Silicides," "Preparation of High Strength Shapes from Crystalline Boron," "Preparation of Hafnium-Free Zirconium," "Control of Atmosphere Beryllium in a Metallurgical Laboratory," "Deposition of Boron."

RFC Loans Total $1.6 Million

Recent loans by Reconstruction Finance Corp. include one of $600,000, for five years, to Standard Electronics Corp., Cranston, R. I., manufacturer of television and radio receiving sets. It is to remedy a deficiency in the company's working capital position. Another is for $1 million, for seven years, to the Shenango Pottery Co., Newcastle, Pa., china and refractories manufacturer, to be expended largely on new plant construction and equipment.

Cathodic Protection Conclusions

Further experiments by Maritime Commission engineers to ascertain best practice in applying cathodic protection to guard its "mothball" merchant fleet against sea water corrosion have yielded these conclusions (subject to a continuance of the investigation):

Graphite appears to be a preferred anode material for vessels tied up at piers where electric current is available from outside sources. But only two vessels are tied up at piers—in Baltimore. Magnesium appears to be the preferred anodic material for the approximately 2000 ships afloat in locations where electric current is not economically available from outside sources.

It has been found that anodes buried in damp earth or sand—on shore or in the ocean bed—work just as well as anodes immersed in salt water. Experiments continue to be made to determine the best shape and size for anodes, as well as to obtain confirmation of the above preliminary conclusions. Incidentally, Bureau of the Budget has approved an appropriation request for $2.2 million for applying cathodic protection to the mothball fleet during the fiscal year starting next July 1, but a beginning cannot be made until Congress acts.

★★★★★★★★★★★★CAPITAL COMPASS★★★★★★★★★★★★

HOUSE REJECTION of the Senate-approved S. 2105, the O'Mahoney-Malone National Minerals bill to provide cash incentives to marginal mine operators and to keep idle mines operative at government expense kills for this session the long-standing effort to get miners—mostly western miners—on the government subsidy list. Starting cost of the project would have been $80 million annually for three years. . .

First congressional move to stymie President Truman's Reorganization Plan No. 1—to abolish the office of general counsel of the National Labor Relations Board and, in effect, make NLRB a 100-per cent labor-dominated unit—is a bill by Rep. Ralph E. Church (Rep., Ill.) to reject it. Mr. Church told the House that the plan is "an illegal attempt, under the guise of being a Hoover commission recommendation, to destroy the effectiveness of the Taft-Hartley Act." Representative Church died of a heart attack last week. . .

Among new grants by the United States Public Health Service to finance water pollution studies is one of $12,900 to Ohio's Department of Health for a study to determine toxicity of electroplating wastes discharged into streams . . .

Public Law 454, 81st Congress, signed by the President on Mar. 10, increases from $13 million to $17 million the authorization for construction of airports in Alaska . . .

"ECA Means Business" is the title of a new film showing how the Marshall Plan operates and how businessmen may benefit from the program. It is available from any Commerce field office for showing to business and related groups. . .

Manufacturers of presses and allied equipment are expected to benefit from a process for producing high-heating-value briquets from "slacks" or "fines" of subbituminous coals; the research work was done by the University of Wyoming with financial assistance from Commerce's Office of Technical Services. Findings are set forth in a report identified as "PD 99806, Briquetting of Dried Low-Rank Coals," available at $2.25 from Office of Technical Services, Commerce Department, Washington 25.

U.S. Finds Road Rougher in Latin Markets

Sales to South America are still above prewar levels but below postwar peak as growing dollar shortages and lower British and European prices cut the Yankee volume

U. S. FIRMS are finding the sales road rougher in South America. Reasons: A growing dollar shortage and lower prices on British and other European metalworking products because of devalued currencies.

Only Cuba, Venezuela and some of the smaller Caribbean republics have found their balance-of-payments position strong enough to permit imports on a relatively unrestricted basis, without exchange controls or broadly applied import license systems, says Henry Chalmers, commercial policy consultant for the Department of Commerce's Office of International Trade. Most Latin American countries further tightened controls over imports last year to hang onto their dwindling dollar reserves. Odds are that more controls will come this year.

Heavy Equipment Holds—Exports to South America of U. S. construction and transportation equipment and heavy production machinery are holding up fairly well. Hard hit are exports of cement, structural steel, hardware, hand tools, small diesel engines, barbed wire and domestic appliances.

Although Latin American imports of U. S. products are well below that of the earlier postwar replenishment period, they're still running at a level several times that of prewar. The overall gap between Latin American exports and imports with the U. S. had considerably narrowed by the end of 1949.

More Bartering—Bartering and bilateral deals between European and Latin American countries are on the increase. Another factor beginning to hurt U. S. trade with the countries to the south of us is the increasing prominence of tariff protection. All Latin American countries—particularly Brazil, Argentina, Chile, Venezuela and Colombia—are industrializing and want to protect infant industries.

Brazil's U. S. Imports Decline

Brazil's imports from the United States are slipping. The nation is trading more with Europe, and her industrialization is making her increasingly self-sufficient.

Brazil's imports from Belgium in 1949 were nearly triple what they were in 1948. Trade with Britain also increased last year.

Major industrialization program in the South American country is National Steel Co. of Brazil's $172 million plant at Volta Redonda. Started in 1947, the facility now consists of an 1100-ton blast furnace, four open hearths, a rail and structural mill, a 72-inch plate mill, a cold strip mill, a tin plate or hot dip mill and a coke plant of 55 ovens. Thus far, the operation is a high-cost affair and can survive only with government protection.

NEA

BULLDOZERS: One feature of the 22nd Agriculture Equipment Exhibition in Paris is this 18-ton tractor that can double as a bulldozer; it is powered by a 140-horsepower engine. The little bulldozer next to it, weighs about a ton and half

The plant is expected to turn out 308,000 tons of rolled products in 1950, which will comprise the bulk of Brazil's rolled steel needs estimated at about 550,000 tons annually. Volta Redonda produces more steel than all the other Brazilian mills put together. By 1951, the plant will produce 375,000 tons of rolled products if it can get a $21 million loan from the Export-Import Bank to finance more expansion.

The plant was built with U. S. technical aid and equipment. Equipment for one of the latest expansion programs is being shipped by Rust Furnace Co., Pittsburgh. It is supplying controls and other accessories for a battery of blooming mill soaking pits. A fuel oil system and burners for the plate and structural mill furnaces were recently designed and furnished by Rust. The new system will provide these furnaces, originally designed for coke and blast furnace gas, with an additional fuel source.

Fuel is Brazilian industry's major problem because domestic coal is poor in quality. It is cheaper for Volta Redonda to import its bituminous than use local supplies. Large-scale exploitation of several promising oil shale deposits in Brazil offers a partial solution to the fuel problem. Oil yields as high as 36.5 gallons per ton of shale have been recovered from rock of the Tremembe area.

Argentine Trade Prospects Dark

The Peron brand of politics in Argentina is no help to American industry trying to export there. Prospects for improvement in the situation are dull because of that factor and these two others: Britain's toehold in the nation's markets is better than ever; trade protection is strong in a country that is one of the most industrialized in South America.

Dollar shortages are thus far hamstringing potentially good sales of U. S. oil-field and coal-mining equipment to Argentina. At Rio Turbio in the far south, four seams of coal have been discovered. They are of good quality and quantity, holding promise of being among the best deposits in South America. The country has oil reserves estimated as adequate for her needs, but thus far she is producing only about 65 per cent of her requirements. About 5 million tons of oil come from Great Britain yearly.

Just completed by the Peron government is a 1100-mile natural gas pipeline from the Comodoro Rivadavia oil fields in Patagonia to Buenos Aires.

Argentina now owns all her railways, following purchases of the four major British-owned networks in

is available to all branches of the 1948. Major project is to standardize the four rail gages that are in use.

The state also owns nearly all the merchant fleet. Argentina's sea-going fleet has grown from 233,700 tons to 1,364,000 tons (built and building). By 1953, it will be the third largest in the world.

Chile Steel Mill Nearly Finished

Last month Chile shipped 46 tons of iron to Ecuador. Small transaction? Yes, but shipments are expected to grow to 200,000 tons annually which Chile hopes to export each year from its new mill at Huachipato, near Concepcion. Engineers of Koppers Co. Inc. have been working on the project since 1947, and it is now almost complete.

Hauchipato will produce 180,000 tons a year for Chilean use; the rest for export, mainly to Ecuador, Peru and Argentina.

The steel project will help diversify the Chilean economy that now is too dependent upon exports of copper and nitrate. An Export-Import Bank credit of $25 million is aiding in financing the program.

Colombia To Boost U. S. Imports

Colombia is one South American country that expects to boost its imports from the U. S. in 1950. Imports from the U. S. should come to about $340 million this year, compared with $240 million in 1949.

The Colombian Government Railways has placed a $2 million order for 26 locomotives with a Belgian company. Delivery will start next summer.

Rheem Makes Foreign Changes

Rheem Mfg. Co., maker of steel drums, has made changes in its foreign operations.

A new company, Rheem Peruana S. A., is now making drums at Lima, Peru. This firm is fully owned by the parent company, but in line with Rheem's policy, participation to local capital will be opened soon.

Rheem also has made an agreement with John Lysaght Ltd., British steel producer, to establish a drum plant in England. The new company, to be known as Rheem Lysaght Ltd., will be 60 per cent owned by Lysaght and 40 per cent by Rheem. Rheem is negotiating to dispose of its interest in Rheem Evenblij N. V., the 40 per cent owned Holland associate. The Holland plant has not come up to expectations, and by effecting the British move the company will shift its European operation to England.

The company also is reducing its ownership in Rheem-Canada Ltd., at Hamilton, Ont., from 85 per cent to 30 per cent. The company's other foreign interests are in Australia, Brazil, Singapore and Argentina.

NAVAL ORDNANCE ENVIRONMENTAL LABORATORY
. . . degrees below zero in the Arctic test chamber

Navy's New Laboratory

Its slogan is: One test is worth 1000 expert opinions. It will test ordnance faster, better

EQUIPPED to do business under any condition encountered in the world, the new Naval Ordnance Environmental Laboratory can test ordnance faster, more economically and with more accurate results than is possible with old field testing techniques.

Dedication of the new laboratory Mar. 23 marked a notable advance in the military preparedness program. The $4 million unit is located on the Naval Ordnance Laboratory reservation at White Oak, Md. There complete services are available to meet any requirement in redesigning to remedy defects shown by the tests.

"One test is worth 1000 expert opinions" is the slogan on the walls of the new laboratory. It was created to meet these three principal "musts:"

Weapons must be capable of standing up under the shocks and strains of transportation and rough handling and under extreme climatic and pressure conditions. They must function without fail when needed. They must be deadly against the enemy, but safe for U. S. forces to handle.

The new laboratory is designed to work principally on underwater weapons and antiaircraft missiles. It armed services and to civilian organizations working on ordnance contracts. Most of the equipment is highly specialized and was made by the Navy or under special contracts. Main facilities of the laboratory are:

1. Vibrating machines to reproduce any degree of vibration incurred in transportation on land, in the sea or in the air, or deriving from the operation of a contained power plant. and at any temperature from minus 65° to 180° F.

2. Impact machines for determining the effect of impact on weapons —as when dropping a mine into water.

3. A high-pressure vessel (consisting of three steel forgings weighing 140 tons) in which such weapons as torpedoes are subjected to sea pressures at any depth.

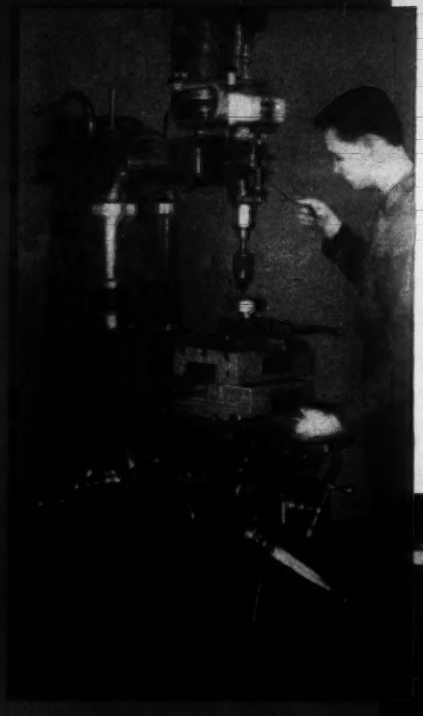
4. Temperature and humidity chambers to determine whether ordnance continues to be effective after being subjected to stringent climatic conditions, or after being moved from one extreme climate to another—moving ordnance from the Philippines to the Arctic regions would be an example.

5. A tank for basic research on what happens when a missile enters water at supersonic speeds. (Speed-photos show that an air pocket follows each missile into the water.) Question: What effect does this air pocket have on the trajectory?

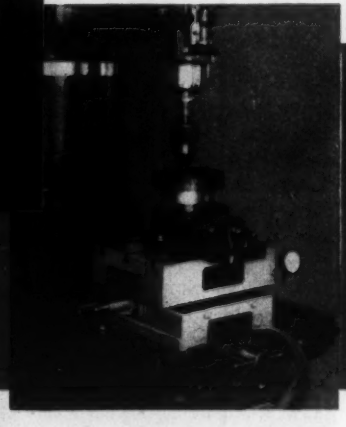
6. Air guns of various sizes, including one which subjects ordnance components to accelerations up to 30,000 times that of gravity. Its use: For determining what sharp acceleration or deceleration does to the internal mechanisms of such ordnance as torpedoes and depth charges.

Thus Spoke Ye—

BULLARD SPACER ... does it do a JOB!



Drill spacing with jigs is now proved to be an expensive art compared to the semi-automatic spacing with Bullard Spacer. No need for designing and making jigs for new jobs. Even throw out the old jigs and operational savings will start.



Unique installation of Bullard 4x4 Spacer on a Tool Room Milling machine.

Nimoff Machine Company, Long Island City, New York, says, "It saves time on small lots and accurately drills, reams, taps and counterbores. Jigs and layouts are eliminated."

For larger work, the 30 x 20 Spacer on 4', 5' or 6' Radial Drills with Accurate Spindles.

The complete story is told in Bullard's 16 MM. sound film entitled, "Interchangeability Without Jigs."

Write for literature on Bullard Spacers. Two sizes, 30 x 20" and 4 x 4".

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Auto builders move to meet new price consciousness of buyers. More standard models being offered. Field reaction to less fancy lines is encouraging

DETROIT

INCREASING evidences of price consciousness among automobile buyers are alerting manufacturers to doing something about it. One of the first moves was to place greater sales emphasis on so-called "standard" models in the 1950 lineups—designs which were stripped down a little, with moldings removed here and there, paint replacing chrome plate, to the point where price could be whittled down by $75 to $100. Field reaction was good and the proportion of standard to deluxe models has been increasing. The industry, of course, does not like the term "standard" so other terminologies have been devised, such as "deluxe" versus "superdeluxe," or "deluxe" versus "custom," but the significance is the same.

Studebaker's forthcoming Champion model is the latest example of the above trend. While the company is not concerned for the moment over sales volume, February and March both being record months, it wants to be ready to meet any price angles which may develop, and therefore plans to schedule as much as 20 per cent of its total production in the lowest-priced model. No chassis changes have been made in the newest Champion and what alterations have been effected in appointments result in weight reduction of only a few pounds. The car still scales at around 2900 pounds, or 300-400 pounds under the Chevrolet-Ford-Plymouth group. Thus, on a price per pound basis, Studebaker still is more expensive, although this means little, since the lower weight would tend to improve performance and economy.

S. A. D. on Commanders—The new "Studebaker Automatic Drive," or torque converter transmission, is now being sampled to dealers on the larger Commander models. The company decided to stick to a conservative identification for the transmission, contrary to other devices of this type. Hundreds of coined names were suggested—"Studematic" being one of the most obvious—but the decision was made to call it just plain S.A.D. No price has been determined as yet, and company officials are not so sure that too many buyers are going to specify the extra equipment, in view of the exceptional performance provided by the conventional synchromesh transmission with overdrive.

Output Up 30 Per Cent — Studebaker fared better than the auto industry as a whole in 1949. As against an industry increase of 18 per cent, its production topped 1948 by 30 per cent, including 304,994 passenger cars and trucks. Dollar sales were up 23 per cent to better than $473 million, bringing a net profit of $11.70 per share, compared with $8.11 in 1948.

Incidentally, the company figures it realized a profit of $1,950,000 on the original investment of $7,430,000 for the purchase of Empire Steel Corp. at Mansfield, O., which was operated for two years before its sale at the end of the last year.

Rambler To Be Unveiled

Prospective car buyers, attuned critically to the price angle, will be paying particular attention to the new Nash Rambler when it is unveiled on April 14. It was demonstrated to the Detroit press last week (after dark), and a special preview will be held in the motor city this week. First model will be a convertible on 100-inch wheelbase which boasts constructional features entirely new to the industry. Later will come a station wagon and then a five-passenger sedan on the same chassis. Nash has bet plenty of millions that these smaller, lighter and less expensive transportation ideas will click with the public, and by six months from now the payoff should be in sight.

Auto, Truck Output

U. S. and Canada

	1950	1949
January	610,211	445,092
February	502,422*	443,734
March		543,711
April		569,728
May		508,101
June		623,689
July		604,351
August		678,092
September		657,073
October		601,021
November		474,731
December		384,318
Total		6,533,641

Weekly Estimates

Week Ended	1950	1949
March 4	124,072	118,267
March 11	124,563	114,223
March 18	134,555	120,741
March 25	137,000	121,341

Estimates by Ward's Automotive Reports

* Preliminary.

K-F Has Small Entry

Meanwhile Kaiser-Frazer will be in there with a 2400-pound five-passenger sedan which will be competing directly with the Nash Rambler. The latter will have about a three-month jump on K-F's entry which may prove to be a substantial lead, since no one knows for sure the extent of the market for these smaller units. If it turns out to be hot, there might be some more entries before the year is out, since both Ford and Chevrolet have well-peeled eyes on the situation and might be able to move in without delay.

Willys Offers New Lines

This week Willys-Overland will take the wraps off its new line of passenger cars and trucks, featuring the first major design change since shortly after the war when the company introduced its all-steel station wagon body. About 2000 dealers and distributors will gather in Toledo to see the vehicles and a new type of 4-cylinder F-head engine to power them. Principal change in bodies has been a complete reworking of the front-end styling. Features like short hood, short turning radius and large cargo-carrying space, are retained.

More Pressure on Prices

For suppliers, the trend appears to point to more pressure on prices, more standardization, increasing simplification of parts design and elimination of weight. There is a premium on new ideas which will pay off in production and the opportunities for contributions are many.

Ford Cuts Costs

Speaking of ideas, there were scores of them tossed in the hopper at the recent Society of Automotive Engineers meeting here. A featured speaker was Del S. Harder, vice president-

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manufacturing, Ford Motor Co., who observed that the progress the automotive industry already has made in reducing production costs has narrowed future possibilities somewhat, pointing up the need in every company for better co-ordination between manufacturing in all its phases, and product design and engineering.

He explained how this had been done at Ford. A manufacturing engineering organization has been set up on the central staff and in each division and major plant. On the central manufacturing staff, the director of manufacturing engineering has eight departments under his supervision, engine processing, sheet metal processing, plant layout, material handling, engineering, industrial engineering, design and standards, production analysis and manufacturing research.

The processing departments are responsible for developing operation sheets and selecting machine tools, fixtures and equipment. Plant layout makes the layouts and selects conveyors and related equipment. Material handling engineers are assigned the supervision of all phases of the movement of materials. The design and standards department develops special equipment and initiates company-wide standards for tools and equipment. The production analysis department "sources" production and makes studies of both present facilities and proposed changes in parts and facilities. Manufacturing research does basic research in metals and methods, in specifications of materials and processes.

In addition to the improvement of plant organization and equipment, Mr. Harder stressed the importance of earning and maintaining the confidence and co-operation of employees, and to help bring about a better understanding among employees and the public of what industry stands for and how it operates.

New Buildings for Ford

More millions continue to be appropriated by Ford to cover additions to plants, buildings and equipment. Latest to be announced is a multimillion dollar group of new administration buildings to be located in Dearborn at Southfield road and Michigan avenue where the company owns a 175-acre tract. The structures will include an 11-story office building to house the company's central staff offices, an adjacent six-story building for headquarters of other operating activities, and a three-story connecting building between the two to contain enclosed parking facilities, service facilities, cafeteria and dining rooms, and possibly an auditorium. The present three-story Ford administration building on Schaefer road, built in 1928, will become headquarters for the Ford Division of the company when the new administration center is completed. Work on the structures is scheduled to start late this year, and the city of Dearborn has been requested to rezone the area to permit construction work to proceed.

Special parking facilities will be provided for visitors to both office buildings, with separate lobbies to accommodate purchasing activities. The buildings will be air conditioned, and all interior partitions will be of a movable type, in soundproofed steel with baked enamel finish. About 2500 will be employed in the center.

A two-story addition to the administration building of the Ford plant in Ypsilanti, Mich., has been planned to provide 34,000 sq ft for the division's quality control and manufacturing engineering departments. The plant employs 1600, manufactures generators, voltage regulators, starters and ignition coils.

STATISTICAL QUALITY CONTROL: Gordon Lyall (center), superintendent of the final assembly lines at the Dearborn assembly plant of Ford Motor Co., explains to representatives of Ford vendors how statistical quality control charts help improve the quality of Ford and Mercury cars

Report on Fuel Studies

Research work with a 3¼x3¼-inch single-cylinder test engine, conducted by engineers of the Ethyl Corp., S. D. Heron and A. E. Felt, has, in their words, "rather unexpectedly" shown the importance of combustion chamber design in putting more "mechanical" octane numbers into automotive engines. They presented extensive data in a paper before the S.A.E. meeting, covering two years of studies of compression ratio upon fuel economy, octane number requirements and engine severity in cylinders of passenger car engine size.

The authors pointed out the study was of academic interest so far as translated into current automotive engine practice is concerned, simply being offered for evaluation by other engineers and research groups busy in this field. They estimated that the best combustion chamber, from a design standpoint, is about 25 per cent better than the poorest as far as its "performance number" rating is concerned. Since 20 performance numbers are equal to 7 fuel octane numbers in the 93-100 octane range, an engine designed to save 20 performance numbers might give the motorist 100-octane performance from 93-octane fuel.

Accent on "88"

April and May production schedules at Oldsmobile have been established to manufacture 62.5 per cent in the Series 88 and 32.5 per cent in the Series 98 models, both being powered by the division's V-8 135 hp engine. Only 5 per cent of the output will be in the Series 76, equipped with 6-cylinder engine, representing a reduction from recent schedules. Olds dealers sold 11,622 cars in the first ten days of March, a gain of 64 per cent over the same period a year ago.

Chevrolet during the same sales interval, shipped 49,461 units, topping the 1949 figure by 46 per cent. Buick deliveries mounted to 15,926, up 61 per cent from last year.

ARISTOLOY STEELS

HIT THE MARK

Large capacity gas or oil fired furnace reheats 20 ton billets prepara-tory to bar mill rolling

ARISTOLOY STEELS

- STANDARD STRUCTURAL ALLOY
- BEARING QUALITY • ALLOY TOOL
- SPECIALTY • NITRALLOY
- CARBON TOOL • STAINLESS
- MAGNAFLUX— AIRCRAFT QUALITY

COPPERWELD STEEL COMPANY, WARREN, OHIO

117 Liberty Street
New York, New York

1578 Union Commerce Building
Cleveland, Ohio

529 Fisher Building
Detroit, Michigan

176 W. Adams Street
Chicago, Illinois

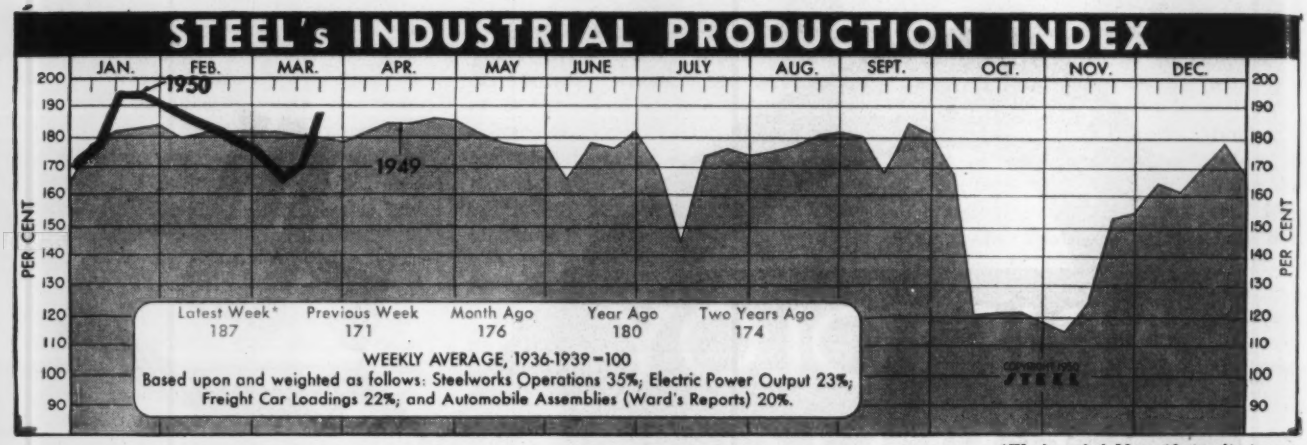
7251 General Motors Building
Detroit, Michigan

3104 Smith Tower
Seattle, Washington

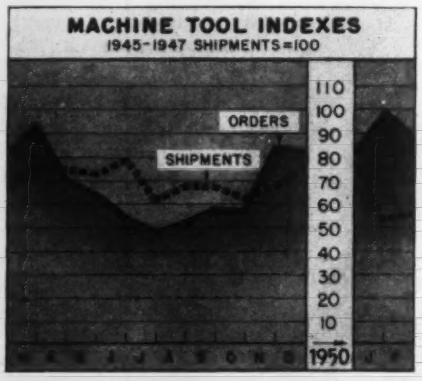
P. O. Box 1633
Tulsa, Oklahoma

403 W. Eighth Street
Los Angeles 14, California

Monadnock Building
San Francisco 5, Calif.



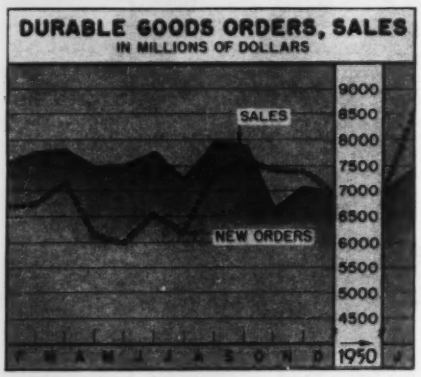
*Week ended Mar. 18 (preliminary).



Machine Tool Indexes

	New Orders		Shipments	
	1950	1949	1950	1949
Jan.	99.7	87.0	52.4	68.8
Feb.	88.7	80.9	55.8	70.3
Mar.	...	93.5	...	75.8
Apr.	...	70.1	...	74.7
May	...	63.7	...	72.8
June	...	53.6	...	79.0
July	...	48.0	...	60.7
Aug.	...	51.5	...	67.3
Sept.	...	57.7	...	67.6
Oct.	...	56.8	...	62.3
Nov.	...	84.3	...	67.6
Dec.	...	82.5	...	75.7

National Machine Tool Builders' Assoc.

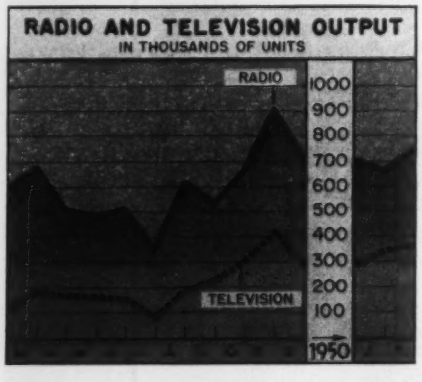


Durable Goods Orders, Sales

In Millions of Dollars

	New Orders		Sales*	
	1950	1949	1950	1949
Jan.	8,578	6,706	7,469	7,550
Feb.	....	6,734	....	7,757
Mar.	....	7,185	....	7,805
Apr.	....	6,127	....	7,445
May	....	5,993	....	7,488
June	....	6,544	....	7,745
July	....	6,195	....	7,207
Aug.	....	7,407	....	7,982
Sept.	....	7,634	....	7,877
Oct.	....	7,432	....	6,542
Nov.	....	7,402	....	7,041
Dec.	....	6,977	....	6,958

*Seasonally adjusted. U. S. Office of Business Economics



Radio and Television Output

Thousands of Units

	Radio		Television	
	1950	1949	1950	1949
Jan.	660	710	336	121
Feb.	750	598	367	119
Mar.	...	679	...	182
Apr.	...	506	...	167
May	...	478	...	163
June	...	512	...	161
July	...	342	...	80
Aug.	...	623	...	186
Sept.	...	532	...	225
Oct.	...	670	...	305
Nov.	...	910	...	414
Dec.	...	707	...	292
Total	...	7,247	...	2,414

Radio Manufacturers Assoc.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Employ. Metalwkg. Mar.20	Gear Sales Mar.6	Steel Castings Feb.27
Constr. Valuation .Mar.20	Ind. Prod. Index ..Mar.13	Steel Forgings Feb.20
Employ., Steel Feb.20	Ironers, Standard ..Mar.20	Steel Shipments Mar.13
Fab. Struc. Steel ..Mar.6	Gray Iron Cast. ..Mar.6	Trucks, Elec. Ind...Jan.2
Foundry Equip. ...Mar.13	Price Indexes Mar.6	Vacuum Cleaners ..Feb.27
Freight Cars Mar.20	Pumps Mar.13	Wages, Metalwkg..Mar.20
Furnaces, Indus. ...Jan.2	Purchasing Power ..Mar.13	Washers Mar.13
Furnaces, W. Air ..Jan.2	Ranges, Gas Jan.2	

Tool Sales Stay High

Although there is little likelihood that either March or April machine tool orders will reach January's high level, the industry expects business to continue in good volume. Orders currently are running about 10 per cent below the January peak and this condition should continue for at least another month.

Automotive orders are the source of much of the activity in machine tools. Companies whose products find no outlet in automotive lines are running behind the pack.

National Machine Tool Builders' Association reports its new orders index declined to 88.7 in February from 99.7 in January. Part of the decline was due to a drop in foreign orders to 18.8 from 26.7 in January.

Shipments rose in February to an index figure of 55.8 from 52.8 in January. Ratio of unfilled orders to shipments was 5.9 to 1 for February, compared with 5.7 to 1 in January.

Association indexes are based on average monthly shipments in 1945-1947 equaling 100. Average annual shipments in the base period were $355 million.

Weekly Mark in TV Output

Television sets were produced in February at the highest weekly average to date, says Radio Manufacturers Association. Manufacturers reporting to the association increased their output to 367,054 sets in February, a 9 per cent increase over 335,588 in January. February's weekly average was 18 per cent higher than in the last quarter 1949 and 98 per cent above the 1949 weekly average.

Radio set production continued in good volume in February. Total for the month was 750,404 sets. Outturn of radio sets has been at a rapid pace since the fourth quarter 1949 following a slump at midyear.

The Business Trend

Production climbs back to prestrike levels despite losses in automobile output. Supplies flowing normally but shortage worries plague metalworking companies

RECOVERY from the coal strike's effects is nearly complete in the metalworking industry and all lines are booming. Even the automotive industry is producing sensationally considering the absence of Chrysler assemblies.

Steel supplies are still a source of worry for many companies. Although the possibility of large scale cutbacks is slight, few producers have large enough inventories to be able to schedule full scale output without fear of interruption. In some lines the problem is fairly serious because this is the time of year when demand is normally strongest. Sales lost at this time may never be fully regained.

Production Index . . .

In the week ended Mar. 18 STEEL's industrial production index came up with a rush and reached a preliminary 187 per cent of the 1936—1939 average. The latest index is 16 points higher than in the preceding week and 7 points higher than in the corresponding week a year ago. Gains were registered in all four categories that make up the index but the biggest advance was in weekly steel rate.

Steelmaking . . .

Steel is again pouring out of the nation's mills at the prestrike rate. Last week the ingot rate moved up to the level attained before the coal strike and indications are it will stay there for some time. The advance was smaller than in the preceding week but that was because operations are nearing practical capacity. In the week ended Mar. 18 the steelmaking rate jumped up 17 points to 90 per cent of capacity.

Coal . . .

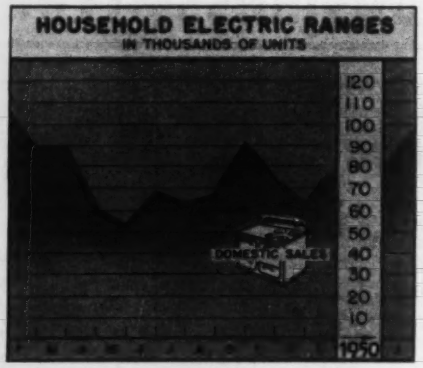
A solid black stream is rapidly filling industrial coal bins. Already there is talk of reducing the miners' workweek to five days to prevent the market being glutted overnight. An indication of how much the mines can be produced with all mines operating at capacity is in the figures for the week ended Mar. 11. That week, the first after the strike, 13.2 million tons of bituminous coal were mined. Production for the corresponding week last year was 10,682,000 tons. About 58.3 million tons of bituminous coal were mined this year up to Mar. 11, compared with 114.6 million tons in the like 1949 period.

Automobiles . . .

Driving to take advantage of the normal spring buying upsurge, automotive plants in the United States turned out 128,128 passenger cars and trucks in the week ended Mar. 18. Canadian plants added another 6427 units to make the grand total 134,555. Assemblies in those U. S. plants operating were at an alltime weekly high. Had there been the 35,000 lost Chrysler assemblies to add to the total a new weekly record would have been written into the books. Chrysler is reportedly ready to begin an allout effort as soon as

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	90.0	73.0	90.0	101.5
	Electric Power Distributed (million kilowatt hours)	6,015	5,937	5,931	5,496
	Bituminous Coal Production (daily av.—1000 tons)	2,200	513	417	1,780
	Petroleum Production (daily av.—1000 bbl.)	4,844	4,827	4,997	5,202
	Construction Volume (ENR—Unit $1,000,000)	$213.2	$210.6	$120.0	$127.3
	Automobile and Truck Output (Ward's—number units)	134,555	124,563	123,712	120,741
	*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	719†	708	560	608
	Business Failures (Dun & Bradstreet, number)	208	221	218	210
	Money in Circulation (in millions of dollars)‡	$27,023	$27,105	$26,993	$27,500
	Department Store Sales (changes from like wk. a yr. ago)‡	−1%	none	none	−8%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$13,124	$13,258	$11,204	$13,872
	Federal Gross Debt (billions)	$255.9	$255.9	$256.7	$252.0
	Bond Volume, NYSE (millions)	$23.0	$20.5	$14.3	$14.5
	Stocks Sales, NYSE (thousands of shares)	8,295	7,532	8,849	3,894
	Loans and Investments (billions)†	$66.3	$66.8	$67.1	$62.0
	United States Gov't. Obligations Held (millions)†	$36,463	$36,774	$37,375	$33,206
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	156.13	156.13	156.13	154.85
	STEEL's Nonferrous Metal Composite‡	157.1	158.5	159.9	223.5
	All Commodities†	151.9	152.0	152.2	158.5
	Metals and Metal Products†	169.3	169.3	169.3	174.5
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

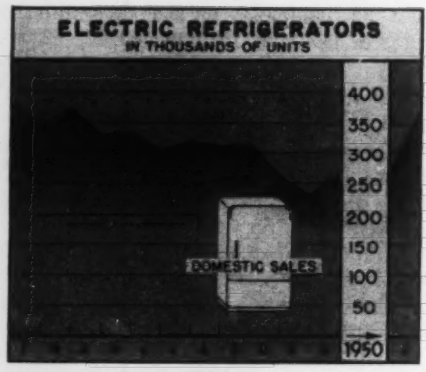


Household Electric Ranges

Domestic Sales—Units

	1950	1949	1948
Jan.	97,925	106,473	103,585
Feb.	.....	87,370	103,506
Mar.	.....	87,543	127,461
Apr.	.....	59,894	104,677
May	.....	52,286	98,983
June	.....	68,107	123,300
July	.....	62,402	83,485
Aug.	.....	66,222	116,107
Sept.	.....	91,073	128,829
Oct.	.....	72,672	122,516
Nov.	.....	60,523	123,661
Dec.	.....	77,011	105,387
Total	.....	903,806	1,341,497

National Electrical Mfrs. Assoc.

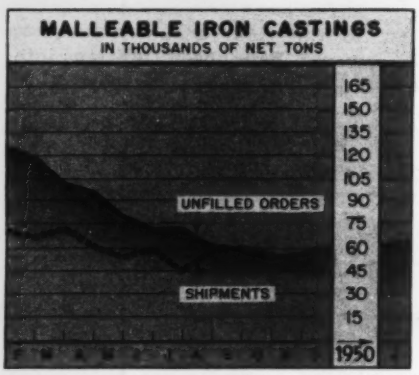


Electric Refrigerators

Domestic Sales—Units

	1950	1949	1948
Jan.	364,002	380,853	272,121
Feb.	.....	337,424	281,580
Mar.	.....	369,216	338,109
Apr.	.....	324,370	330,720
May	.....	330,753	317,763
June	.....	296,199	373,115
July	.....	315,444	351,094
Aug.	.....	307,622	281,345
Sept.	.....	309,429	344,260
Oct.	.....	252,580	380,854
Nov.	.....	221,221	374,470
Dec.	.....	259,158	330,660

National Electrical Mfrs. Assoc.



Malleable Iron Castings

Thousands of Net Tons

	Shipments		Unfilled Orders*	
	1950	1949	1950	1949
Jan.	62.9	71.9	62	126
Feb.	...	66.7	..	118
Mar.	...	72.1	..	102
Apr.	...	61.3	..	95
May	...	54.6	..	79
June	...	59.6	..	70
July	...	44.4	..	71
Aug.	...	58.1	..	61
Sept.	...	60.5	..	58
Oct.	...	57.2	..	54
Nov.	...	49.4	..	56
Dec.	...	57.4	..	61
Total	...	713.1		

*For sale. Bureau of the Census

Charts—Copyright 1950, STEEL.

its workers return. The company has stocked a large bank of materials and components for the time when its assembly lines begin to roll.

Construction . . .

Although 1950 was expected to be a good year for construction, awards to date are still a pleasant surprise. Civil engineering construction volume for the first 11 weeks this year is $2159 million, 38 per cent above last year. Private industrial building which according to earlier forecasts was to have slumped 13 to 15 per cent this year has recently picked up steam and is now 3 per cent above 1949.

Private construction as a whole is 50 per cent ahead of last year. Public construction is 26 per cent above 1949 totals for the corresponding period.

Truckloadings . . .

American Trucking Associations says volume of freight transported by motor carriers in January was 1.9 per cent over December and 12.3 percent over January, 1949. Carriers reporting to the association hauled a total of 3,147,259 tons in January, 1950.

Iron and steel carriers hauled about 4 per cent of total tonnage. Their traffic volume increased 2.9 per cent over December and 12.3 per cent over January, 1949.

Strong Appliance Demand

Production at high levels for all this year predicted. Home building enlarges market

APPLIANCE demand in good volume for all this year is predicted by James J. Nance, president, Hotpoint Inc., Chicago, and other sources support his forecast. A survey by the National Association of Real Estate Boards shows that 83 per cent of the 470 cities reporting expect to equal 1949 home construction marks and one-third of them expect to do even better.

This survey like many others indicates that continuation of rent controls acts as a deterrent to rental building and investment. Congress is lukewarm to continuing these controls and if controls are abandoned or passed in some watered down version, an upswing is expected in rental construction.

More Low-Cost Houses—High volume housing construction either as private residences or as rental property provides the appliance industry with a ready market for all forms of appliances. An increase in the number of residences being built for $8000 or less may mean that new home buyers will have more money left after their purchase with which to buy appliances. The Real Estate Boards survey shows 90 per cent of the cities are producing houses to sell under this figure. Percentage of building in this price range varies in different cities but the median report is between 45 and 50 per cent.

Sees Larger Market—In a letter to Hotpoint Dealers, Mr. Nance points to the approximately 1 million homes to be built this year as well as high employment and savings as broadening the market for new appliances. Hotpoint factories although operating at capacity are unable to meet present appliance demand, he says.

The company's rise from ninth to third place among appliance builders, continues Mr. Nance, "reflects outstanding products, sound and aggressive marketing programs and a strong organization of carefully selected dealers." Believing the demand is present the company will put into immediate action new programs for 1950. Construction of a modern refrigerator plant is further evidence of the company's faith in the future, he says.

Sales Up 90 Per Cent

First quarter sales 90 per cent above the like 1949 period are re-

ported by C. G. Frantz, president, Apex Electrical Mfg. Co., Cleveland. This year's first quarter sales total is estimated at $7 million and overshadows first quarter 1949 sales of $3,615,510.

Aggressive sales and advertising programs together with a newly styled appliance line have created improved buying and near capacity operations, Mr. Frantz says. Apex has established a new fiberglas molding division for producing washing machine parts formerly made of metal, he reveals, and these parts have been highly successful in their operation.

In explaining 1949 reverses Mr. Frantz lists: Drop in consumer buying, necessity for liquidating inventories because of this drop, lowering of prices to encourage buying even before costs were reduced and introduction of new products with consequent delays in attaining satisfactory unit costs through volume production.

These situations have already been corrected, he says, and the readjustment from wartime levels has placed the company in a sounder condition for the future.

Alltime High for Frigidaire

February was the biggest sales month in history, reports Mason Roberts, general manager, Frigidaire Division, General Motors Corp. The division's Dayton, O., plant is on a six-day week in almost all operations, he says.

"Traditionally this is our busiest time of the year, but 1950 has been most unusual in this respect," Mr. Roberts states. "Orders for our products during February were double our production and during the first two weeks of March orders have far exceeded the corresponding period last year."

Lockheed Has Good Backlog

Lockheed Aircraft Corp., Burbank, Calif., is reaping the benefits of stepped up deliveries and is in a period of increased earnings. A sizable backlog carries the firm well into 1951.

Included in the $230 million backlog are $45 million in orders for commercial Constellations.

Spare parts business is running close to $18 million annually.

Current military production includes patrol planes for the Navy, F94 jet fighters and jet trainers for the Air Force.

Lockheed also has hopes of getting Air Force orders for its new F90 jet penetration fighter.

More Unemployed

Administration may try to put heat on business to absorb the jobless

CLIMBING unemployment is causing increasing concern among government economists and officials. They are considering ways to put the heat on business to check or reverse the trend.

Should unemployment continue to rise—to possibly 7 or 8 million by July when this year's crop of students joins the labor force—you can look for the government to increase its expenditures in an attempt to alleviate the problem of the jobless.

Rising joblessness it not so much a result of decreasing jobs as of a growing labor force. There is little argument that our economy will have to expand to take care of this growth. Just how much of this growth industry can and must absorb is the specific area of discussion.

7.4 Per Cent Unemployed—Labor Department figures show unemployment in February was 4,684,000 or 7.4 per cent of the total labor force. This prompts Leon Keyserling, acting chairman, President's Council of Economic Advisers to warn business it must expand 3 to 4 per cent annually to combat unemployment. Many businessmen see an implication in his statements that if business can't do it government will.

Commerce Department figures show that employment last month in nonagricultural establishments was 556,000 higher than in February, 1949, despite strikes that cut the possible total. This increase accounts for half the growth in the labor force during the period.

Fewer Farm Workers—A decrease of 770,000 agricultural employees, compared with the like month a year ago accounts for more than half the rise in unemployment. Another 142,000 were added by a decrease in the armed forces. These two categories account for 912,000 out of a 1,463,000 gain in unemployment.

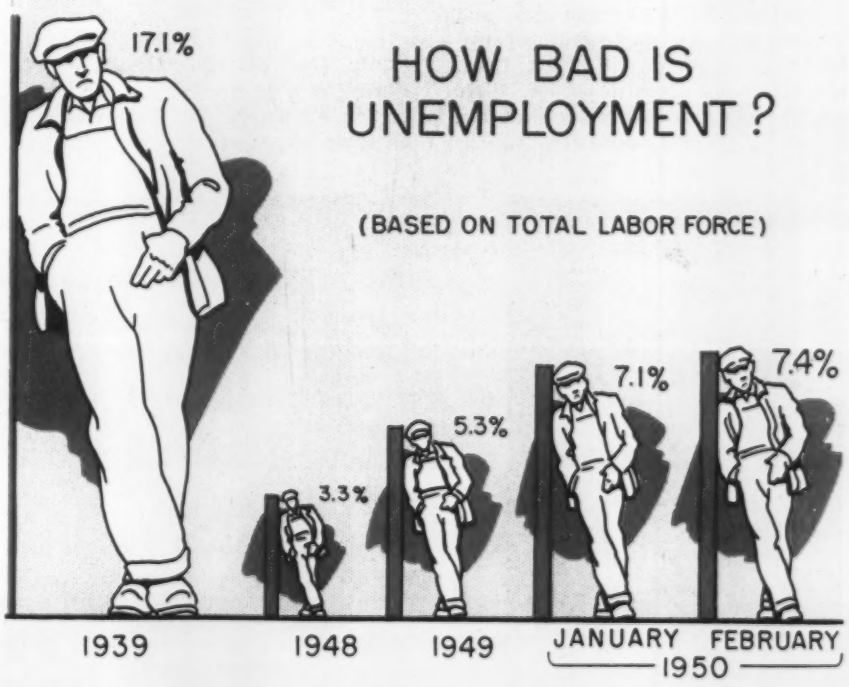
Still the rise in postwar unemployment shown in the accompanying chart as percentages of the total labor force does present a challenge to industry. If unemployment goes over 5 million this year, as government statisticians predict, it is virtually certain remedial measures will be adopted. Business had better be ready to defend itself; some of the pills offered may have a bitter taste.

Shortage in Engineers?

Engineering students graduating from colleges this June, and for some time to come, have good chances to get jobs, prophesies American Society for Engineering Education.

The society believes that unless the percentage of high school graduates entering engineering colleges increases, there will be a shortage of engineering graduates, not a surplus as widely predicted. The disturbances of the early war years caused a much publicized shortage of engineers. This appeared likely to change to a surplus when, in 1946, 93,000 freshmen enrolled in U. S. engineering colleges. That constituted 8.6 per cent of high school graduations that year, compared to 3.2 per cent prewar.

Freshmen engineering enrollments have declined steadily since 1946.



Men of Industry

A. G. Hendrickson was appointed assistant sales manager, P&H Welding Division, **Harnischfeger Corp.**, Milwaukee. Associated with the division many years, he served for five years as welding engineer in Milwaukee and Minneapolis territories. He also served as Farm Bureau consultant on welding.

—o—

Robert E. Holmes was appointed New England district sales manager, industrial-aviation division, **R. M. Hollingshead Corp.**, Camden, N. J. He formerly was divisional export sales manager, Monsanto Chemical Co., Merrimac Division, Everett, Mass.

—o—

Harold B. Freeman Jr. was named purchasing agent for **Phoenix Iron & Steel Co.**, Phoenixville, Pa. He succeeds **A. M. Willett**, resigned.

—o—

George H. Davis has joined the iron and nonferrous casting section, development and research division, **International Nickel Co. Inc.**, New York, and **Robert E. Savage** and **Ralph W. White** joined the division's magnesium-containing cast iron section.

—o—

Ivan A. Bickelhaupt has joined **John W. Harris Associates Inc.**, builder of New York and Chicago, as Washington representative. He formerly was a captain, civil engineering corps, U. S. Navy, and is on inactive status.

—o—

Kaiser Steel Corp. appointed **George B. McMeans** as works manager, and **Edward J. Duffy** as general superintendent of its plant at Fontana, Calif. Mr. McMeans succeeds **F. M. Rich**, resigned, and Mr. Duffy succeeds Mr. Means as general superintendent.

GEORGE B. McMEANS

EDWARD J. DUFFY

WALTER A. HUBER

Walter A. Huber was appointed general manager, wire rope division, **John A. Roebling's Sons Co.**, Trenton, N. J. The appointment is part of a plan to decentralize the company's various divisions. He will assume new duties Apr. 1. For the last nine years Mr. Huber has served as manager, preformed wire rope sales, for American Chain & Cable Co. Inc., and has been secretary of the Wire Rope Institute for the last ten years.

—o—

Reynolds Metals Co., aluminum division, Louisville, appointed **F. F. Tiffany**, formerly district manager of the Dayton, O., office, as division manager in the Pittsburgh area, with headquarters in the Pittsburgh field office; and **T. D. Lewis** as division manager, Atlanta office.

—o—

Purdy Co., Chicago, elected **H. L. Purdy** as vice president, with office in San Francisco, and **Frank Pickett** as scrap buyer in San Francisco.

FRANKLIN FARREL III

Franklin Farrel III was elected executive vice president, **Farrel-Birmingham Co. Inc.**, Ansonia, Conn. **Joseph LeMay** was elected secretary and assistant treasurer, and **Mrs. Williford Whiteside**, assistant secretary. All other officers and members of the board of directors were re-elected.

—o—

Edna M. Kubik was appointed sales manager, **Protector Products Inc.**, Cleveland. Miss Kubik formerly was assistant sales manager, Wedge Protectors Inc., Cleveland.

—o—

L. W. Ellis was named sales representative in Oklahoma and the western part of Arkansas for residential, commercial and institutional boilers, radiators and heating accessories produced by **National Radiator Co.**, Johnstown, Pa.

—o—

William C. Etheredge was appointed general staff manager, general sales department, **United States Steel Supply Co.**, subsidiary, U. S. Steel Corp., Pittsburgh, his appointment effective Apr. 1. He succeeds **Eugene G. Sheasby**, named assistant district manager, Pittsburgh warehouse.

—o—

Don Smith was appointed production manager, polishing and finishing division, **Midway Tool Co. Inc.**, Melvin, O. He will also act in the capacity of expediter of the company's new Mirbrite auger bits for hand braces and electric drills.

—o—

Roger Bowen was appointed head of the engineering department, **Electric Development Co.**, Los Angeles. **D. Frank Jackson**, acting chief engineer since the death of **Edward Neifing** in 1947, continues in

strip steel by WEIRTON

Strip steel, hot- or cold-rolled, is made by Weirton to satisfy the most exacting requirements of its users. Superior equipment and methods, along with complete control of materials from mine to finished strip, assure the remarkable uniformity for which Weirton is noted.

Weirton customers enjoy *two* important advantages—the uniform quality of Weirton steel, and the dependability of Weirton service. In short, Weirton makes good steel and gets it to you.

WEIRTON STEEL COMPANY

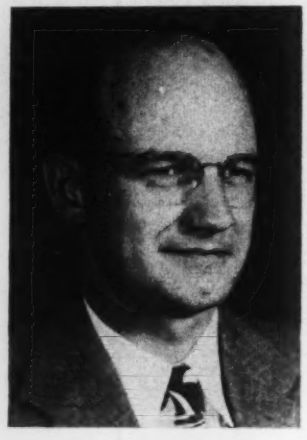
WEIRTON, W. VA., *Sales Offices in Principal Cities*

Division of **NATIONAL STEEL CORPORATION** *Executive Offices, Pittsburgh, Pa.*

the engineering department as chief assistant to Mr. Bowen.

—o—

Russell G. Runyan was appointed general purchasing agent for **Oliver United Filters Inc.**, Oakland, Calif.



RUSSELL G. RUNYAN

He will have headquarters at the company's Hazleton, Pa., plant. Mr. Runyan succeeds **G. I. Williams,** retired. He formerly was with the purchasing department at Oakland, and for the last year was in charge of the purchasing department at Hazleton. **Leonard K. Armstrong** was appointed assistant purchasing agent in charge of purchasing at Oakland.

—o—

H. H. Morgan was appointed general manager, and will continue as vice president and chief engineer, **Robert W. Hunt Co.**, engineer, Chicago.

—o—

Carl J. Spain was named consulting engineer at San Francisco for **Westinghouse Electric Corp.**

—o—

Arthur Templeton was appointed to the sales engineering staff of **Templeton, Kenly & Co.**, and will cover the Chicago territory. For the last four years he served in the production department.

—o—

Harrison Abrasive Division, Metals Disintegrating Co. Inc., Elizabeth, N. J., appointed **William O. Faxon** as manager of sales, New England and Middle Atlantic states.

—o—

H. E. Maser, Grant building, Pittsburgh, was appointed representative of **Kerrigan Iron Works Inc.**, Nashville, Tenn.

—o—

Ralph A. Clark, formerly in the Chicago office of Electro Metallurgical Division, **Union Carbide & Carbon Corp.**, has been appointed assistant manager of development in the Detroit territory. He succeeds **William B. McFerrin,** recently promoted to division executive vice president of the corporation's Haynes Stellite Division, Kokomo, Ind.

—o—

Wilfred R. Ogg was appointed sales representative for northern New England by the grinding machine division of **Norton Co.**, Worcester, Mass. **Howard P. Chace** succeeds **Mr. Ogg** in charge of the sales engineering department.

—o—

Thomas P. Gallagher was appointed assistant sales manager, **Munray Products Inc.**, Cleveland. He was formerly with Atlas Engineering Co.

—o—

Lawrence E. Hills will represent **Rapids-Standard Co. Inc.**, Grand Rapids, Mich., in the Cleveland area.

—o—

William E. Clark was appointed general manager, engineering works division, **Dravo Corp.**, Pittsburgh, and he was elected a member of the corporation's executive committee. Mr. Clark has been a director since 1946 and a vice president since 1947. His successor as general manager, Keystone Division, is **Louis P. Struble Jr.**

WILLIAM E. CLARK

—o—

Alex Miller, Columbia Iron & Metal Co., Cleveland, was appointed to represent the **Institute of Scrap Iron & Steel Inc.**, Washington, as counsellor to the Chamber of Commerce of the United States. He served in the salvage division of the WPB and as scrap consultant to the Department of Commerce. **Nathan S. Addlestone,** Addlestone & Co. Inc., Sumter, S. C., was appointed chairman of the yard dealers committee of the institute.

—o—

Additional electrical division sales offices established by **Wagner Electric Corp.**, St. Louis, are in New Orleans, under the direction of **N. G. Alvis,** and in Davenport, Iowa, under direction of **S. R. Snyder. G. W. Morris,** with the Omaha, Nebr., sales office, has retired, and is succeeded by **G. D. Jackson** as electrical division representative.

—o—

Thomas I. Crowell Jr. and **Charles B. Cooke** were elected vice presidents, **Ford, Bacon & Davis Inc.**, New York.

—o—

Herbert H. Rogge was appointed to the newly created position of executive vice president, **Canadian Westinghouse Co.**, with headquarters in Hamilton, Ont.

—o—

Roland C. Perrault was promoted from sales representative to manager of **Detroit Steel Corp.'s** Worcester, Mass., district office. **J. B. Ribakoff,** until recently a vice president of the corporation and manager of the Worcester office, has retired.

—o—

Romos Enterprises, Cincinnati, bought controlling interest of **Israel Bros. Co.**, Dayton, O. **Henry Israel** will continue as vice president and general manager and retains a substantial share in the concern. Other officers, named after the purchase, are **David Moskowitz,** president; **Philip Moskowitz** and **S. G. Rose,** vice presidents; **Joseph H. Hoodin,** treasurer, **Fred Weiland,** secretary.

—o—

A. W. Pollard, Rochester, N. Y., was named sales engineering representative for Aurora Metal Co., in New York state exclusive of New York city.

—o—

Leonard A. Davis was elected president of **Morrison Engineering Corp.**, Cleveland. He succeeds **Carl R. Sare,** resigned to assume other responsibilities. Mr. Davis formerly was associated with Lombard Corp., Youngstown, and has long been active in sales and engineering of hydraulic

LEONARD A. DAVIS

machinery and heating equipment for the light metals industry.

—o—

H. F. Hagenauer was appointed purchasing agent, **Ahlberg Bearing Co.**, Chicago. He succeeds the late **P. F. McGuinn,** for many years vice president and purchasing agent of the company. Mr. Hagenauer, with Ahlberg for 31 years, became assistant purchasing agent in 1922.

H. F. HAGENAUER

—o—

Madden Brass Products Co., Chicago, organized to handle the Electrimatic line of refrigeration fittings, appointed **F. H. Moss** sales manager. He formerly was with the Electrimatic Division, Simonize Co.

—o—

J. Allison was appointed sales representative for Oregon and Washington by **Titan Metal Mfg. Co.,** Bellefonte, Pa. He will have two offices, one in Seattle, the other in Portland, Oreg.

—o—

Robert J. Stoup was appointed plant metallurgical engineer at the Ambridge, Pa., plant of **Spang-Chalfant Division,** National Supply Co.

—o—

James G. Witte was appointed aseral sales manager, **American Box Co.,** Cleveland. He formerly directed all packaging at Montgomery Ward, Chicago, and was national director of the Society of Industrial Packaging Engineers.

—o—

Arthur Kendrick was elected vice president and general manager, **Austin Bros. Steel Co.,** Dallas, succeeding the late **William D. Barry.**

ARTHUR KENDRICK

—o—

Norris W. Embry, president, General Box Co., Chicago, was elected president, **Wirebound Box Manufacturers Association.** He succeeds **Ramsey Simmons** of the Elberta Crate & Box Co., Bainbridge, Ga., who was elected vice president for the next year. **John R. Miller Jr.,** T. R. Miller Mill Co., Brewton, Ala., was elected a director to succeed his father, the late **John R. Miller.** Also elected directors are **George Kubes,** American Box Co., Cleveland, and **Shelley Schuster,** Great Southern Box Co., New Orleans.

—o—

William S. Venn was named general sales manager, **Willys-Overland Motors Inc.,** Toledo, O. He succeeds **Howard O. Lund,** resigned.

—o—

Kennametal Inc., Latrobe, Pa., appointed **John D. Cook** as a representative in the northern Indiana area, and additions to the Kennametal service personnel are: **William J. Bruun,** Chicago; **Harry E. Brandvik,** Chicago; **E. J. Novack,** Philadelphia.

—o—

J. C. Poole, assistant purchasing agent, **Hydraulic Press Mfg. Co.,** Mt. Gilead, O., was promoted to director of purchases. Associated with H-P-M for a number of years, he was appointed assistant secretary in 1948. He had former association with Jones & Laughlin Steel Corp.

J. C. POOLE

—o—

Donald M. Hesling, master mechanic of **Sealed Power Corp.,** Muskegon, Mich., was appointed director of the newly established division of the company to be known as the research and development engineering division. It will be responsible for the designing and engineering of the company's product machinery and its products. Assisting Mr. Hesling will be **J. H. Bullard,** chief technical engineer; **D. A. Paull,** chief metallurgist; **V. H. Bathrick,** chief machine designer; **H. M. Olson,** consultant engineer; and **H. Kieldsen,** engineering change coordinator.

—o—

Carl W. Schaffner, formerly manager, Spencer-Heater Division, Avco Mfg. Corp., has joined **Sprout, Waldron & Co. Inc.,** Muncy, Pa., as superintendent of its gray and white iron foundries.

OBITUARIES...

Henry M. Miller, chairman of the board **American MonoRail Co.,** Cleveland, died Mar. 16.

—o—

Joseph A. Laughlin, manager, labor relations division, **Atlas Powder Co.,** Wilmington, Del., died Mar. 14.

—o—

Edward M. Stroman, 71, president, **Metaloy Corp.** and **Non-Ferrous Foundry Inc.,** Niagara Falls, N. Y., died in Buffalo, Mar. 14.

—o—

William E. Dever, 55, a member of the law department, **International Harvester Co.,** Chicago, died Mar. 13 after a short illness.

—o—

Frederick D. Ryan, 57, president, **Allyne-Ryan Foundry Co.,** Cleveland, died Mar. 18 while on vacation in Florida. He served as president of the company since 1944.

—o—

Harold A. Kyte, 55, production manager, **Homer Furnace Co.,** Coldwater, Mich., died recently.

—o—

Louis G. Neeb, plant superintendent, **Kunkle Valve Co.,** Ft. Wayne, Ind., died Feb. 10.

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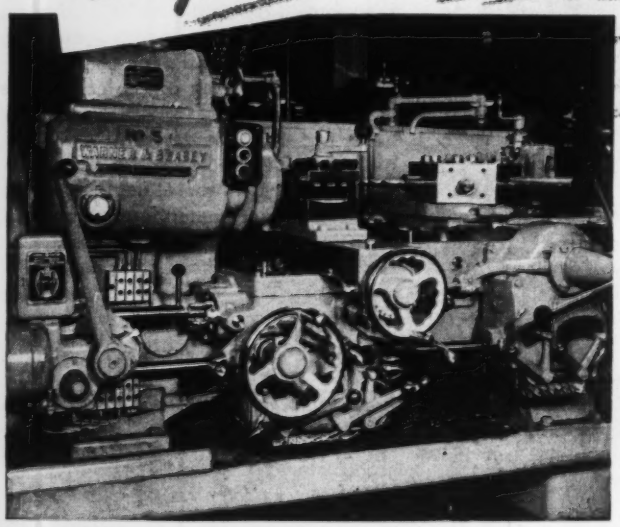

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Production AND Engineering NEWS AT A GLANCE

SAVES FUEL AND FLOOR SPACE—To shorten drying time of its refrigerator evaporators after fluxing and prior galvanizing, Philco Corp., Philadelphia, uses to a limited degree, exhaust gases from the galvanizing settings for heating and drying the work. Exhaust flues from the galvanizing settings carry the gases to a point directly below the conveyor transporting the evaporators from the flux tank to the settings. Procedure not only provides an efficient drying setup with no additional fuel costs, but also saves floor space.

IMPROVES ALUMINUM CASTINGS—Brighter, smoother and more durable aluminum permanent mold castings are now produced through a new process referred to as Velvaglaze developed by Monarch Aluminum Mfg. Co., Cleveland. Initial tests indicate the method helps retard, and in some cases, resists corrosive action to a degree not possible on ordinary commercial work. The process, the company reports, actually provides a denser surface through its ability to seal pores of the casting, increasing wearing qualities. Thus far it is found ideal for products such as agitators commonly employed in automatic and wringer-type clothes washers.

CONTROLS PICKLING DEPTH—Both tension of steel strip and the depth it travels through four successive baths of hot sulphuric acid are governed by a magnetic loop control in a new pickling setup employed by Weirton Steel Co., Weirton, W. Va. The General Electric developed control which is activated by an electric coil embedded in the bottom of the second tank sets up a magnetic field in the sulphuric acid which in turn is influenced by steel strip passing through the tanks. Thus strip moving through the bath at the wrong depth causes amount of current passing through the coil to be changed. Amplified difference between changed and standard current is used to regulate the motor driving the roller feeding the steel to regulate automatically immersion depth.

CUTS DOWN MAN-HOURS—By moving its small-item supply bins by units rather than dismantling them and repackaging the items, Long Beach Naval Shipyard effects a saving of 26,000 man-hours. The four 3 x 2 x 7-foot sections of the bins containing electronic parts are picked up with forklifts equipped with side plywood protectors to prevent loss of items in transit. According to the Department of Defense, this reduced time required at each end of the move from an estimated 15,000 to 2000 man-hours.

PREVENTS "WATER CORROSION"—Corrosion of steel and iron by circulating water can be almost completely prevented by addition of small amounts of tungsten and molybdenum compounds, the Institute for the Study of Metals at the University of Chicago reports. The compounds, sodium tungstate, potassium tungstate, potassium molybdenate and sodium molybdenate, are expected to be especially useful in air-conditioning and cold-storage industries. According to the institute, rusting can be stopped by dissolving a few hundred parts of the tungsten and molybdenum compounds in a million pounds of circulating water or brine. Water circulating through steel pipe can corrode 4 pounds a year per square yard of exposed metal. Brine is even more corrosive.

CUT WIRE SHOT—It is well known that shot blasting is a very useful engineering process for changing surface characteristics of highly stressed parts to increase life and reduce failure. But what is not generally known is that the process now can be used to even greater advantage by simply employing shot of cut wire in the peening operations. Average life of front wheel auto springs, for example, is increased to 700,000 cycles by blasting with ordinary shot. But when subjected to action of cut steel wire shot, life is increased to around 4,500,000 cycles. (p. 66)

PROMISING TECHNIQUE — A report from the Atomic Energy Commission reveals that hot pressing beryllium powder shows considerable promise in producing rather large, simple shapes suitable for further finishing. The method consists of consolidating metal powder to a high density compact by simultaneous application of heat and pressure. Although the technique is inherently slow, and a somewhat costly process, it does have several advantages metallurgically, and extends the powder method to other fields. (p. 71)

DOWN-TO-EARTH THEORY—Much literature appears about automatic controls or servomechanisms as applied to open hearths, but unfortunately most of the treatments are largely mathematical. As a result many engineers and steel plant operators regard the theory as beyond them. In attempting to simplify discussion on the subject, the author in this case confines his remarks to answering three questions. What should be controlled, what control accuracy is needed and how should controls be effected. (p. 76)

LOW COST TURNING—Small lots of two or three pieces can be produced with the economy ordinarily associated only with long-run production by the latest tracer-controlled repetitive shaft-turning method developed by Monarch Machine Tool Co., Sidney, O. The low-cost procedure involves a device combining electronic controls with basic principles of automatic sizing lathes to increase productiveness and improve accuracy. (p.83)

...ion Summary—p. 35 ...et Summary—p. 111

Closing Research-Manufacturing Gap Brings About

MAJOR PRODUCTION ECONOMIES

By applying scientific knowledge involving all phases of engineering, GM's process development section helps the company's various divisions to effect spectacular improvements in manufacturing efficiency. Cut wire shot peening and shot blasting, welding nuts to sheet metal, tub method of polishing and buffing, new painting techniques are a few of the projects which have paid off in lower costs

By R. J. EMMERT
Executive in Charge
Facilities & Processes Staff
General Motors Corp.
Detroit

BETTER products, reduced manufacturing costs and improved working conditions for employees are some of the achievements of GM's process development section. Bridging the gap between research and actual manufacturing, the section is called upon to make practical engineering and operating suggestions to the various GM plants. Results of the program have been spectacular. Among the projects developed, one is of particular interest to product engineers. It is our work with shot peening and shot blasting. This is not a new process in our factories, since it has been used for many years, but it was considered principally as a method of cleaning parts, and one that was usually placed in an outer building where the dust and dirt would not be harmful to production machinery.

Part Life Increased—Research discovered that by peening the surface of highly stressed parts subject to repeated stress, the life of those parts was greatly increased. Shot peening was used to a considerable extent for treating the fillet edges of bearings on crankshafts, connecting rods and other parts of aviation engines. It has become a standard method of treating front wheel suspension springs. When applied to large parts on a production basis it became apparent that the process was expensive due to the large amount of shot that was required, the maintenance of the equipment and, in addition, the results secured were somewhat erratic.

Process development section was first brought into the picture for the purpose of developing a method of separating the fine broken up shot material from that which was still useful, in an effort to reduce the usage of shot. It soon became apparent that instead of utilizing the cast iron shot more effectively, we should have a shot which would not break up readily and could be used over and over again. The only question was how to get such a material.

Cut Wire Shot—It is a good engineering principle when starting out on a problem to set down on paper the specifications of the material you want and the results to be achieved. Since peening, and not cutting, was the process involved and since the part to be treated was made of spring steel, the specifications for the most desirable shot were fairly apparent. Material very tough, very ductile and about as hard as spring steel—obviously, cold drawn spring steel wire with about 65 points carbon and the hardness of 50-C Rockwell was indicated. Spring steel wire was readily available but the cost of chopping it up in small pieces seemed at first prohibitive. However, we made up a fixture which would feed ten strands of wire into a cutter and mounted this on a husky milling machine, Fig. 1. Cost of cutting up the wire was not nearly as high as at first thought—in fact, the results were not only pleasing but also proved to be rather exciting.

Fig. 2 shows the basic operation of this fixture. The wire is pulled off reels and fed across a die, or shearing edge, into a milling cutter, whose rapidly revolving teeth shear off the diameter lengths of the wire.

Knowing that the physical properties of hard drawn spring wire would make a superior shot, we ran tests on different steels comparing them with known performance records of cast shot. We finally chose SAE 1065 hard drawn spring wire, a material readily available. Number of cycles it ran through our Pangborn shot testing machine in comparison with commercial shot:

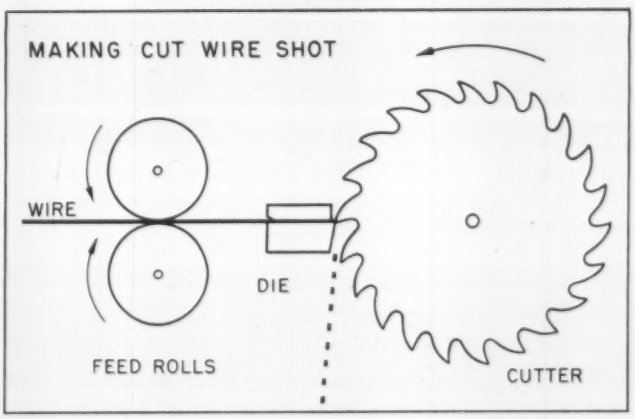
Cut wire shot	1,670 cycles
Cast malleable	41 cycles
Cast iron	10½ cycles

Cost of Cut Wire Shot Before and After Use—Fig. 3 illustrates chilled iron shot and cut wire shot before and during use. A shows conventional chilled iron shot as purchased. B shows this same shot after 10 passes through a shot blasting machine. In C cut wire shot is shown. D is our cut wire shot after 300 passes through the same machine. The changeover to this shot could be very rapid. No alterations need be made on present equipment.

From data presented before the SAE annual meeting, Detroit, Jan. 9-13, 1950.

Fig. 1 (above)—Fixture mounted on this husky milling machine feeds ten strands of wire into a cutter

Fig. 2 (right)—Drawing showing basic operation of fixture. Wire is pulled off reels and fed across a die, or shearing edge, into a milling cutter, whose rapidly revolving teeth shear off the diameter lengths of the wire



Reduction in shot consumption will necessitate its use from an economic standpoint. GM has used over 8000 tons of malleable and chilled iron shot annually. It appears that if cut wire shot were to be used throughout the corporation, the cost would be reduced from approximately $990,000 to $450,000—an annual saving of over one half million dollars. However, the practicability of using cut wire shot in the cleaning of castings, because of the excessive carryout, has yet to be proved.

Shot Cleaning—Cut wire shot is used for cleaning castings in the Cadillac foundry. The shot consump-

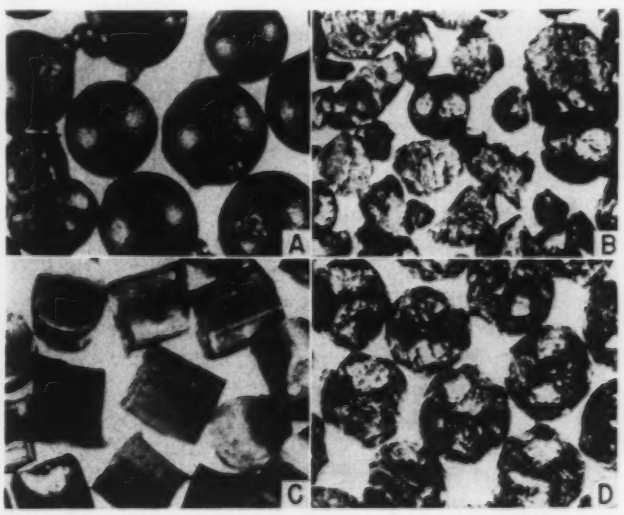


Fig. 3—(A) New chilled iron shot; (B) used chilled iron shot; (C) new cut wire shot; (D) used cut wire shot

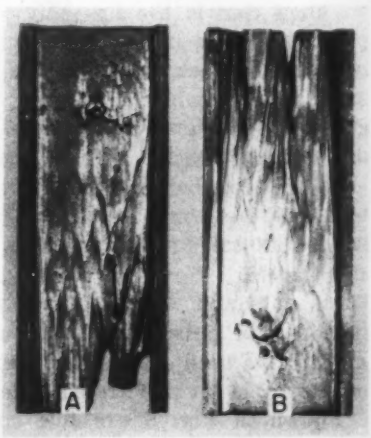
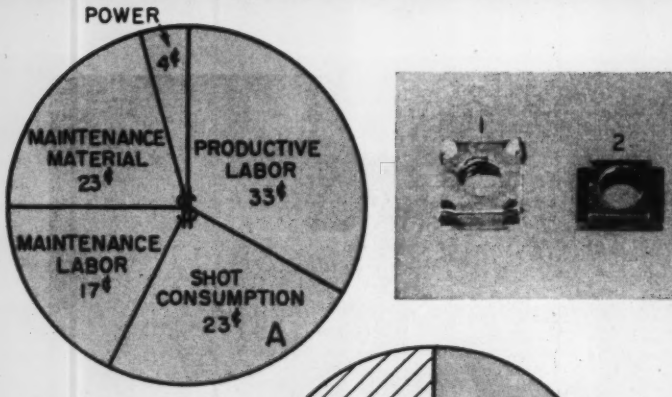


Fig. 4 — Used impeller blades. (A) 10 days with chilled iron shot, (B) 120 days with cut wire shot



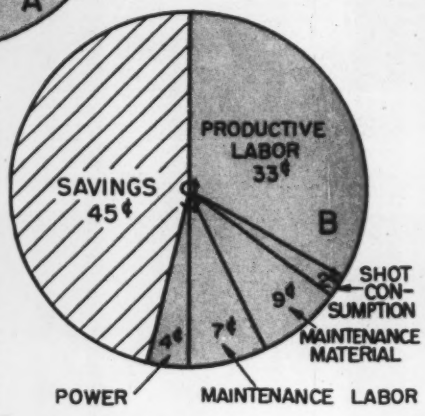


Fig. 5 — Distribution of the cost dollar on the average shot cleaning operation. (A) Present shot cleaning cost. (B) New shot cleaning cost (45 per cent reduction). Costs are based on those prevailing November, 1949

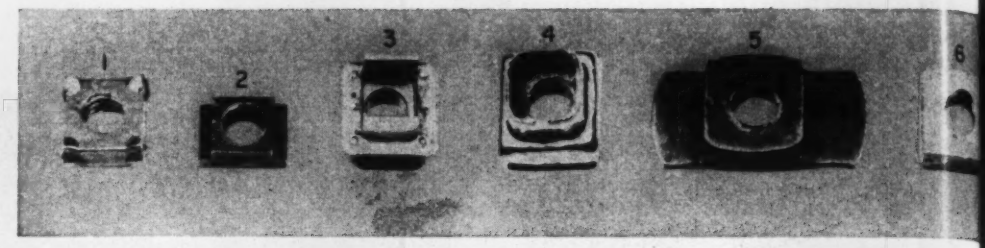


Fig. 6—Various attached nuts. (1) Weld nut, (2) clinch nut, (3) clinch nut, (4) clinch nut, (5) tee nut, (6) square nut

tion was reduced 49 per cent. The cleaning cost per part was reduced by more than 16 per cent.

A machine is set up in the project shop. With modifications to the machine and improvement of the shot, the cost of the process is considerably lower. It appears to be of particular advantage for cleaning forgings in place of the pickling process very generally used. First, the cost of the cleaning will be materially reduced and second, the problem of disposing of the pickling wastes will be solved and this has become an acute and a serious problem in itself. Shot blasting appears to be an answer to part of the stream pollution problem.

Wear and Maintenance — One plant used 1300 pounds of cast iron chilled shot every day in peening front wheel springs. Using cut wire shot this same operation requires only 74 pounds per day. A large portion of our shot cleaning and peening dollar is spent for maintenance. The average life of impeller blades using cast iron chilled shot is 10 days. One plant reports after using cut shot for 120 days, no replacement of these parts was required, Fig. 4. A set of blades costs approximately $17.60.

Cost Comparison—Fig. 5 shows a comparison of the distribution of the cost dollar for the average shot cleaning operation when using present commercial shot and when using cut wire shot. The present shot cleaning dollar is spent as follows:

Productive labor	33c
Shot consumption	23c
Maintenance labor	17c
Maintenance material	23c
Power	4c

The new shot cleaning cost based on actual experience so far and on the same production is as follows:

Productive labor	33c
Shot consumption	2c
Maintenance labor	7c
Maintenance material	9c
Power	4c

Saving 45c

Front Wheel Suspension Springs — Without shot peening, a front wheel spring made from well ground steel bars will average about 170,000 cycles of compression. With the introduction of shot peening, the average life of springs was increased to 700,000 cycles. At the same time, bars having less highly finished surface were used.

Using steel shot, the life has been increased to the neighborhood of 4,500,000 cycles. As a practical matter, they wear out the test machine—they just don't break.

Controllable Engineering Process — Cut wire shot can be made uniform when new and it maintains that size after months of machine operation. Shot blasting is a very useful engineering process for changing the surface characteristics of highly stressed parts to increase life and reduce failure. All elements entering into it should be controlled. Cut wire shot which retains its size indefinitely gives that precise control for the first time, since other variables in the machine can readily be held constant.

Therefore, the process deserves the renewed attention of product engineers. How many other parts can be shot blasted to improve their quality? How much weight can be taken out of parts without decreasing their quality? Of course, such parts as crankshafts, connecting rods, axle shafts, pinion shafts, come to mind.

Welding Nuts To Sheet Metal—One of the problems submitted by one of our divisions seemed at first to have rather limited possibilities. It was the problem of attaching nuts to sheet metal. We had thought this problem had been pretty well solved, although we knew that in the assembly department there were plenty of cases in which the nut which should have been on the back side of a fender skirt was not there after the assembler had pried around with a bar to get it in position. That trouble accounted for some of the cars, at least, going into the repair area.

A large number of people have worked on this problem and they have come up with an assortment of weld nuts and various methods of attaching nuts to sheet metal. However, when you look at the cost of these nuts and compare them with the cost of common square nuts, and then consider the great number of nuts used on automobiles, you soon realize that considerable savings are possible.

Shown in Fig. 6 are five special nuts commonly

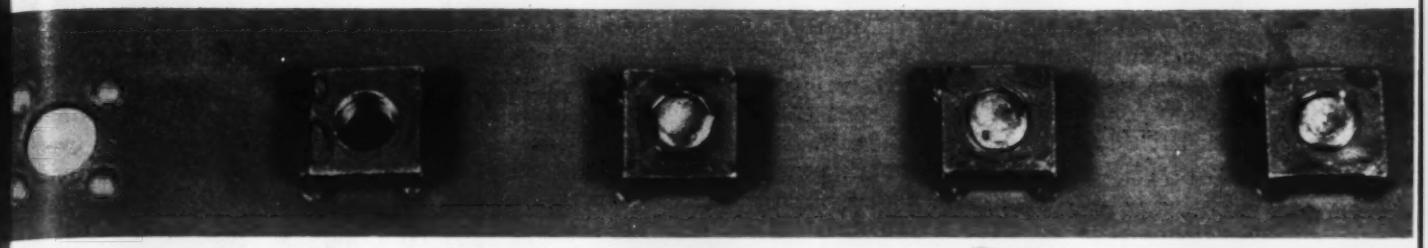


Fig. 7—Test strip with resistance welded plain square nuts is shown here

used in the fabrication of cars, plus the common square nut. Average prices for 5/16-18 nuts, starting at the left in Fig. 6 are:

No. 1—A special weld nut costs approximately $5.25 per 1000;
No. 2—A clinch nut at $3.75;
No. 3—Another clinch nut at $5.25;
No. 4—Still another clinch nut at $6.10;
No. 5—A tee nut at $11.00;
No. 6—A common square nut which costs only $2.30 per 1000.

Cost of the square nut is approximately one-third the average cost of special nuts. We developed a method by which it will be possible to substitute this common square nut for the costly special nuts. The idea originated in the following manner.

We were asked to develop a welding fixture for one of the special nuts which was causing considerable trouble. Thread damage was excessive and frequent misalignment in projection welding the sheet metal panels and brackets also occurred. The engineer assigned to this problem developed a successful fixture, but being familiar with this work and conscious of the high cost of special nuts, developed a method which is indicated on Figs. 7, 8 and 9 showing: A test strip, the welding application, and a die used in our experiment.

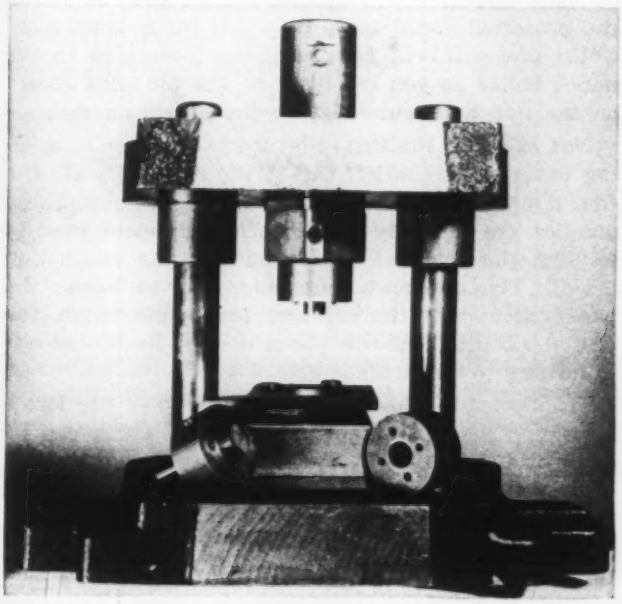
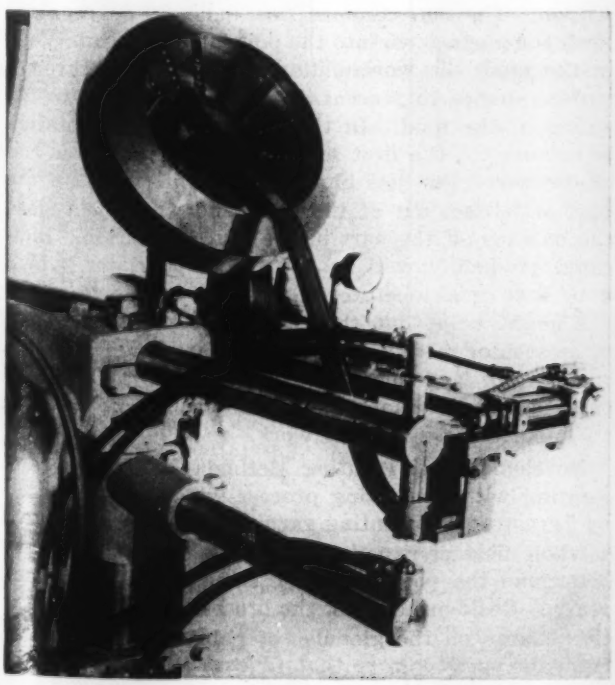


Fig. 8—Experimental punch and die

Fig. 10—Application of automatic feed device fitted to a standard spot welder



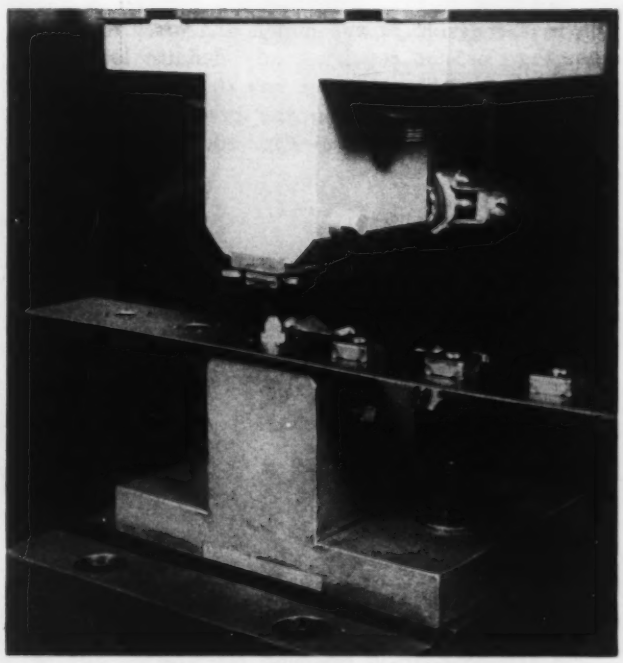


Fig. 9—Nut welding fixture

Fig. 7 shows the test strip with resistance welded plain square nuts. On the left end is the hole punched in the strip for the bolt to go through with the four dimples to form the welding surfaces. First nut on the left side shows the clean threads and neat appearance typical of this method. The next three nuts show the broken screws which were sheared off in demonstrating the strength of the weld. Torque requirement tests prove that they were more than twice as strong as necessary.

Punch and Die—The experimental punch and die shown in Fig. 8 was used to test and prove the principle. When bolt clearance holes have to be punched, the projected dimples can be added for a small additional cost. It will require adding four pins to the punch collar as you see lying on the die shoe shown on the left, and four holes to die, shown on right.

Nut Welding Fixture—Fig. 9 shows the nut welding fixture. At the left end of the test strip, are the four dimples projected up around the bolt holes. These dimples are the only additional requirement used in welding the common square nuts to the production parts. The clearance bolt hole used to locate the work piece over the locating pin is shown in the center. Top half of this pin is used to locate the nut in relation to the punched hole.

The operator places the workpiece over the locating pin. The arrow indicates the nut which can be hand or hopper fed to the top electrode where it is held by spring tension. As the top electrode descends to make the weld, the nut is guided by the locating pin and is quickly resistance welded. Shoulder of the spring-actuated pin is forced against the under side of the nut to seal out any weld flash.

In another test strip with resistance weld plain square nuts, the hole is considerably larger and extruded somewhat so the corners of the nut rest on the extruded metal. This method involves a variation in the design of the punch and die. It has the advantage of not requiring any definite location of the corners of the nut, but has the disadvantage of having less strength than the previous method.

Automatic Feed Device—Fig. 10 shows the application of our automatic feed device fitted to a standard spot welder. The nuts are simply dumped into a hopper from which they are fed automatically to the head of the welding machine so that all the operator has to do is locate the sheet metal part over the locating pin on the lower jaw of the welder and trip the foot control. You can readily see that the application of a nut can be made as rapidly as the sheet metal can be moved from point to point.

Tub Method of Polishing and Buffing — Another project in which we became interested was that of polishing parts in a revolving tub of slightly abrasive material. We are impressed with the results secured by Ternstedt on small hardware parts. So we experimented at first on a single spindle drill press. That took a lot of power, was a messy job, and didn't look too good. But very irregular parts were polished uniformly by the method, and they were polished quickly and cheaply.

Therefore, we built a single spindle machine in which the tub revolved and the work holding fixtures could be moved angularly so as to present all sides of the part to the action of the mud. Moreover, the machine was large enough to handle parts such as used on grilles and bumpers. Immediately, the process became more interesting. We found we could polish a steel part in 15 seconds. That becomes more important when you consider how some of our chrome plated parts are designed. Many of them must be drawn to the very limit of the ability of steel to stretch. They are of such irregular shape that the usual type of polishing heads cannot be arranged to polish all of the surface, and in some cases the part has tongs on the edges with which to attach the part to eliminate screws. The tongs catch in the buffs and make even hand buffing difficult and dangerous.

4-Station Polishing Machine—Fig. 11 is a picture of the machine. It consists of four fixture holding columns, two tubs which revolve in opposite directions, and a water washing and abrasive recovery station. The four columns rise, index 90 degrees and push the parts down into the polishing material. When in the mud, the workholding fixtures move through various angles to present all sides of the part to the action of the mud. In the second tub, the rotation is opposite to the first so as to polish the outer end of the part. Air jets blow the polishing mud off the part as it rises out of the tubs, and water jets rinse the balance off the part in the fourth position. Indicated production will be 450 pieces per hour, which is as fast as an operator can handle the parts.

I might point out that the successful application of an idea or method may involve the design and construction of large pieces of equipment, so that the design and construction of intricate machinery becomes an important part of our work.

Development of Painting Methods—We are experimenting with a painting process which is being used by Ternstedt for painting garnish moldings. We have a whole field of experimental work to go through to determine the possibilities of using the method generally. Basic principle of the process is to put a negative charge on the globules of paint as they emerge from the spray gun so that (*Please turn to Page 94*)

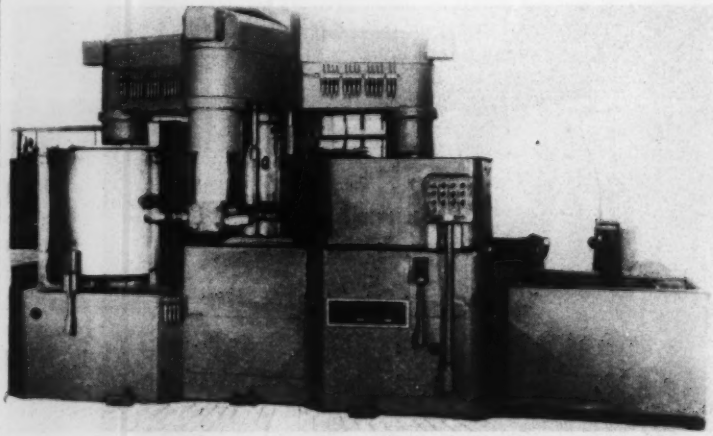


Fig. 11—Four-station polishing machine consists of four fixture holding columns, two tubs which revolve in opposite directions and a water washing and abrasive recovery station

HOT PRESSING BERYLLIUM POWDER

Beryllium hot pressed powder compacts of practical theoretical density are made up to about 12 inches in diameter and 4 inches thick by the process discussed here. Radiographs and metallographic examinations show metal is uniform and structurally dense. Tensile test data indicate properties comparable to beryllium fabricated from castings

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HOT PRESSING of beryllium powder shows considerable promise as a feasible technique for the production of rather large, simple shapes suitable for finishing (usually by machining) to a desired product. The pressings are not subject to cracks or porosity. In addition, hot pressed powder serves as a useful intermediate product or starting material for extrusions, forgings, rolled sheet, etc. Fine grain size is very important, as the general workability of beryllium is largely a function of grain size.

The hot pressing method consists of consolidating metal powder to a high density compact or shape by the simultaneous application of heat and pressure. There is nothing new in this concept, but it has not been much used commercially for powder metallurgy production because it is inherently a slow, somewhat costly process compared to the more common "cold press-sinter" technique. It does have the advantage, however, of permitting the production of much larger shapes than are practicable in the cold press-sinter method; and in general higher densities are possible.

Materials Used—Practically all the work described in this article was done using Brush Beryllium Co. powder of three grades: "Technical grade" powder containing, in general, the greatest per cent impurities, particularly flux from the reduction process; "premium grade" powder; and vacuum remelted powder. Theoretically, these grades are in ascending order of purity, but there is some question regarding the relative purity in these three grades and, in fact, the level of purity in any grade. According to Brush's own analyses, the greatest impurities in any of the grade are BeO, flux (mainly MgF_2), calcium, iron, and aluminum. They do not report carbon or nitrogen. It is almost impossible to cite a typical analysis, but the following figures (in per cent) are representative of recent "premium grade" metal: BeO, 1.04-3.01; flux, 0.01-1.51; Ca, 0.1-0.3; Al, 0.026-0.13; Fe, 0.094-0.12.

Technical grade metal is metal as-reduced from the reaction $Mg + BeF_2 \rightarrow MgF_2 + Be$. Premium grade metal is technical grade that has been remelted under a calcium fluoride cover and cast; this operation is said to be of primary use in eliminating excess flux from the as-reduced metal. Vacuum remelted metal, as the name suggests, is metal, usually of technical grade, which has been vacuum melted and cast. It is general practice to use beryllium oxide crucibles for melting the metal.

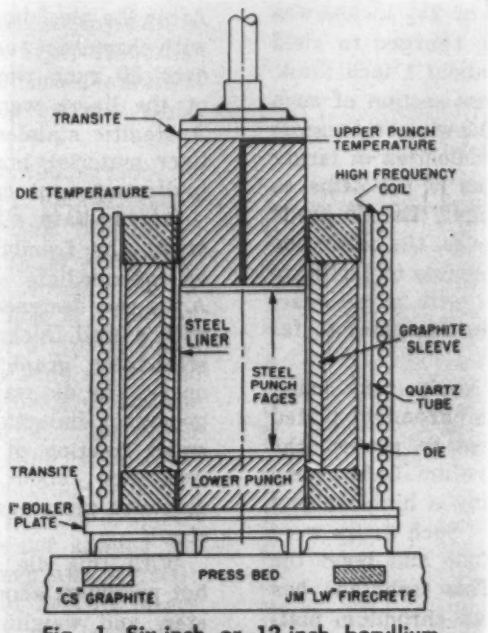

Fig. 1—Six-inch or 12-inch beryllium hot pressing die assembly

Small Scale Hot Pressings—Early work on hot pressing of beryllium was done in National Carbon Co. C5 grade graphite dies lined with mild steel to prevent carburization of the beryllium. Pressures in the neighborhood of 700 psi, and temperatures near 1000° C yielded fairly well consolidated metal with times of maximum load application of about 1 hour. However, optimum conditions in the three main process variables were not determined; hence the first step in the investigation was to determine these conditions within a reason-

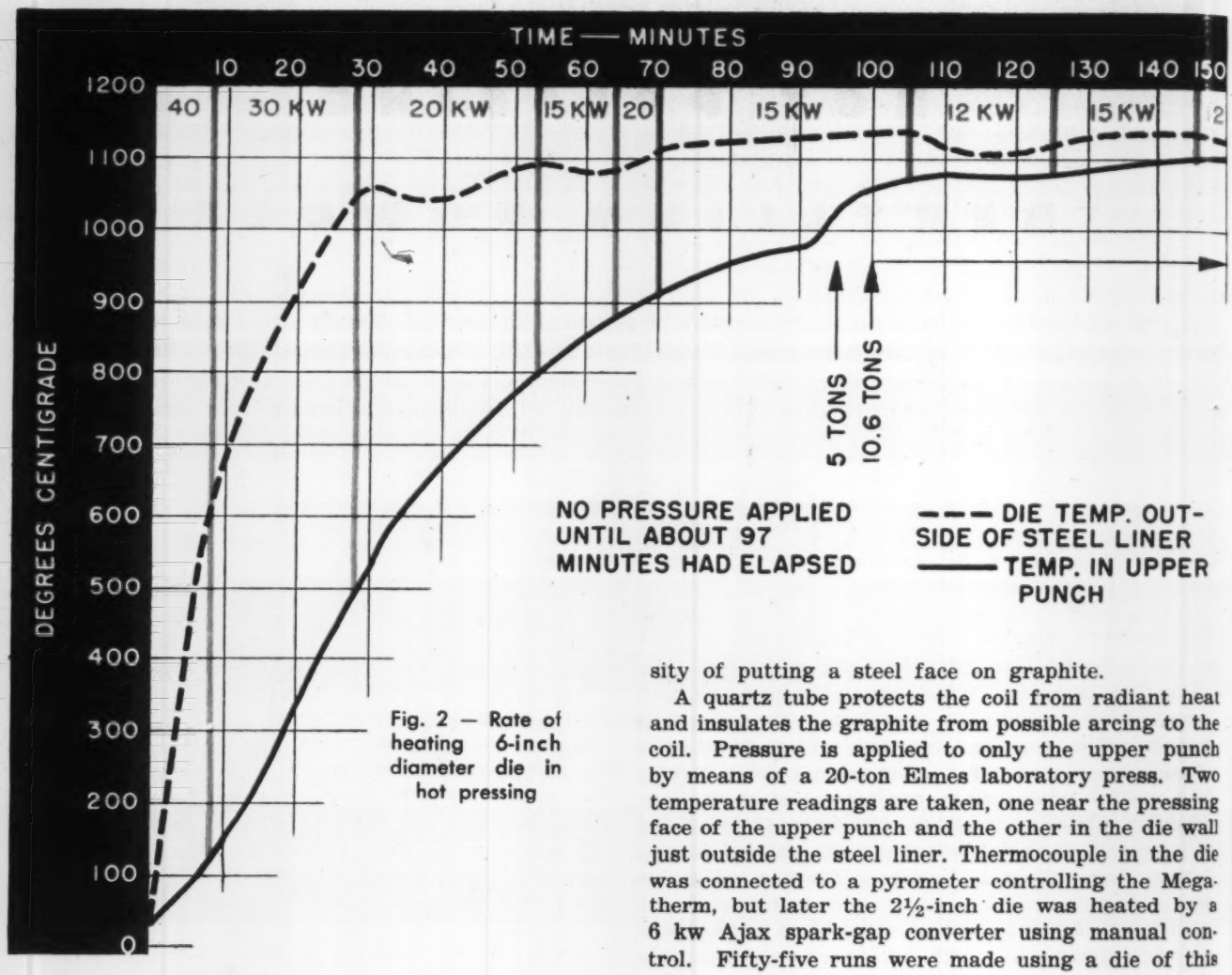

Fig. 2 — Rate of heating 6-inch diameter die in hot pressing

able degree of precision.

It was first necessary to decide upon a suitable scale of operation; one that would not be too extravagant in the use of the expensive beryllium powder. A die of inside diameter of 2½ inches was chosen, with enough powder being charged to yield a compact of above diameter and about 1 inch thick, weighing about 150 grams. A cross section of such a die is shown in Fig. 1; this drawing represents the die arrangement used in the production of larger pieces, but except for minor details is the same as employed with the 2½-inch pressings. The C5 grade graphite die has two liners of sleeves, the outer one of graphite with a ½-inch wall thickness to facilitate disassembly, the inner one of steel with a one-quarter inch wall split longitudinally in one place to facilitate removal of the punches.

Except in the case of several early runs using the 2½-inch die, the steel liner is chromium plated on the inside and outside surfaces to protect the steel from the graphite and the beryllium. Later, some die liners were prepared by spraying a high melting glass on calorized steel or Inconel. Such liners were fired at a high temperature to fuse and bond the glass to the metal before use. This technique has proved to be more satisfactory than chromium plating. For the 2½-inch die, punches were usually made of low carbon steel thus obviating the necessity of putting a steel face on graphite.

A quartz tube protects the coil from radiant heat and insulates the graphite from possible arcing to the coil. Pressure is applied to only the upper punch by means of a 20-ton Elmes laboratory press. Two temperature readings are taken, one near the pressing face of the upper punch and the other in the die wall just outside the steel liner. Thermocouple in the die was connected to a pyrometer controlling the Megatherm, but later the 2½-inch die was heated by a 6 kw Ajax spark-gap converter using manual control. Fifty-five runs were made using a die of this size.

In several of the early runs, unplated steel liners melted, probably due to the formation of the Fe-C eutectic at 1130° C, or possibly the formation of a ternary eutectic of Fe-C-Be at a lower temperature. After the steel liners were plated on the outside only with chromium (using copper and nickel underplates), over 30 runs were made without melting; several of the liners were used for more than four runs. Austenitic stainless steel was not satisfactory as a liner material, possibly because of the formation of multicomponent eutectics.

Intermediate Sized Hot Pressings—In order to study the feasibility of preparing larger samples, an intermediate size of 6 inches was chosen next. A die was designed similar to the one shown in Fig. 1 with a wall thickness of 2 inches and equipped with steel-faced graphite punches instead of solid steel ones. The die was heated by a 200 kw Tocco motor-generator induction heating unit. However, only a small fraction of the capacity of the heating unit was used; about 30 kw maximum for the 6-inch diameter pressings and about 50 kw for the 12-inch size.

With this die, it is possible to make beryllium hot pressings about 2 inches thick, 6 inches in diameter, and weighing about 4 pounds. Pressure for

From data presented in Atomic Energy Commission report AECD-2679.

this die was applied by an 80-ton Manley frame press with an approximately 4-foot high by 5-foot wide opening. A special bed of 6-inch channel iron sections and 1-inch steel plate as shown in Fig. 1 was used to adapt this press for hot pressing work. Moldable refractory shapes ("Firecrete"—Johns-Manville) were made to cover the bottom and top of the die; these were also made for the 12-inch size, discussed in the next paragraph.

Large Beryllium Hot Pressings—After four successful hot pressings of beryllium were made in the 6-inch die, a 12-inch die with about 3-inch thick walls was made for use on the Manley press. In this die, it was possible to make a beryllium hot pressing of over 30 pounds. At this scale of operation, difficulties were encountered which had not appeared in the 6-inch diameter size. The graphite die now required a 24-inch diameter quartz tube (pipe) for thermal and electric insulation. This size proved to be impractical to use from the standpoint of handling and actual use around the die, as it was too fragile. Although the quartz pipe was used for all three large pressings, it is planned to substitute some other material for any future work at this scale.

Operational Procedure—In general, the procedure for making a beryllium hot pressing is the same for all die sizes. The entire die with the exception of the upper punch is assembled in place on the press. Alundum cement is used to seal the split in the steel liner and clearance between the die and lower punch to prevent beryllium loss. After the alundum cement has dried, the beryllium powder is scooped into the die with the press hood partially open and the operator wearing a protective mask. Upper punch must be placed in position with care to prevent the blowing out of the beryllium powder throughout the die-punch clearance.

During operation, the temperature in the die wall and at the bottom of the upper punch (which is considered to be the temperature of the beryllium) is taken every few minutes to control heating rate and maximum temperature. A controlling pyrometer has not been used with the Ajax high frequency unit or the Tocco motor-generator set because manual control of the power proved to be entirely satisfactory.

Temperature of Liner—Since the temperature at the steel liner should not exceed approximately 1130° C even with chromium plating because of danger of alloying, rate of heating is controlled, mainly by the rate of heat transfer through the die parts to the beryllium. Fig. 2, which is a plot of the two temperatures versus time for a typical 6-inch beryllium hot pressing run, shows that about 100 minutes are required to bring the inside of the die to temperature, approximately 1100° C. The power input used at various stages of pressing is indicated along the top of the graph. Lag of temperature in the upper punch with respect to the die wall is apparent. For this run the pressure was not applied until the temperature in the upper punch was at 1000° C; the immediate increase in rate of heating is apparent. Normally, a few hundred psi is applied when the upper punch temperature has reached 500° C; pressure applied at such lower temperatures appears to be unnecessary or undesirable. Final increase in pressure to 750 or 1000 psi is not applied until the beryllium is above 1000° C, and then is held until 1100° C is reached, and thereafter for 30 to 45 minutes.

If melting of the steel liner has been avoided, the removal of the beryllium block from the die assembly is quite easy. After removing both punches, the graphite split sleeve is pushed out of the graphite die, and the two halves of the sleeve separated. This leaves the beryllium more or less stuck to the plated steel liner. Sometimes a minor tapping at the longitudinal slot in the liner with a cold chisel is sufficient to open the liner enough to allow the beryllium to slip out. Often, however, the liner is sufficiently alloyed to the beryllium so that considerable chiseling is required to remove the compact. The surface of the compact varies from usually quite smooth at the punch faces to more or less rough at the cylindrical surface, depending upon the amount of interaction between the beryllium and the steel liner.

At first, ventilation for beryllium hot pressing on the Manley press was provided by a 4-inch diameter exhaust pipe with a flared end. Later, the press was completely enclosed in a hood at the recommendation of the health-physics department. Filters have been provided in the exhaust system to prevent volatile fluorides, oxides, and super fine beryllium particles from being discharged into the outside air.

Experimental Results—Over 50 runs were made with the 2½-inch die to evaluate operating variables. A tabulation of the more significant runs is given in Table I. It seemed desirable to develop operating conditions where the holding time would be fairly short in order to aim at good production per unit time and to avoid tying up equipment and personnel for extended periods; the principal variables of temperature, pressure, and time were chosen with this end in mind.

TABLE I
2½-INCH DIAMETER BERYLLIUM HOT PRESSING CONDITIONS AND DENSITIES

Run	Pressure psi	Temperature	Time at temp.	Density gm/cc	Grade of Powder
21	500	960	30	1.64	Premium
20	500	980	45	1.66	Premium
26	500	1000	30	1.68	Premium
23	500	1050	15	1.60	Premium
39	500	1075	90	1.64	Premium
19	500	1100	15	1.87	Premium
38	500	1115	30	1.83	Technical
24	750	915	25	1.39	Premium
30	750	1020	30	1.46	Premium
32	750	1075	30	1.85	Premium
33	750	1075	30	1.85	Premium
36	750	1098	7½	1.70	Premium
46	750	1125	30	1.84	Premium
25	1000	900	30	1.40	Premium
29	1000	1030	30	1.71	Premium
45	1000	1075	30	1.85	Technical
35	1000	1078	30	1.87	Premium
50	1000	1095	30	1.87	Technical
34	1000	1100	30	1.83	Premium
51	1000	1104	30	1.87	Technical
52	1000	1100	30	1.86	QT Machining Chips
53	1000	1100	30	1.85	Vacuum Remelt
54	1000	1100	30	1.86	QT Machinist Chips
54	1000	1100	30	1.84	Vacuum Remelt

TABLE II
SIX-INCH BERYLLIUM HOT PRESSINGS

Run	Pressure psi	Temp. ° C.	Time Temp.	Density gm/cc	Grade of Powder
1	1000 psi	1096	60 min.	1.86	Technical
2	1000 psi	1104	45 min.	1.87	Technical
3	1000 psi	1106	60 min.	1.86	Vacuum remelted
4	1000 psi	1105	45 min.	1.86	Premium
5	750 psi	1095	40 min.	1.85	Technical
6	750 psi	1106	45 min.	not determinable	Clifton Flake

TABLE IV
TENSILE PROPERTIES OF BERYLLIUM

Type of Beryllium	Yield Stress 0.2% effect 1000 psi	Ultimate Tensile Strength 1000 psi	Elongation in 2"—%	Young's Modulus psi x 10^6
KAPL pressing technical powder	34.1	43.9	1.12	40.8
KAPL pressing premium powder	35.8	48.0	1.36	42.4
KAPL pressing vacuum powder	33.0	46.0	1.12	39.5
Brush QT pressing	25.2	30.1	0.91	36.1
MIT vacuum cast extruded	30.1	41.0	1.76	44.6

TABLE III
BeO ANALYSES OF HOT PRESSED BERYLLIUM SAMPLES

Sample No.	BeO Per Cent	Description
KAPL* 2	1.88	pressed from vacuum remelt powder
KAPL 3	1.87	pressed from Brush premium powder
KAPL 4	3.02	pressed from Brush technical powder
Brush 1	2.27	Brush "QT" block

*Knolls Power Atomic Laboratory

When pressure was in the region from 750-1000 psi and when the temperature was close to 1100° C, density of the hot-pressed beryllium powder approached theoretical (1.86 g/cc). Densities were determined by weighing cylinders that were of regular shape.

While the effect of pressing time was not studied in much detail, what evidence is available indicates that some variation from 30 minutes holding time has no large effect on density. Of the three variables mentioned above, temperature is the most sensitive in the general region of operating conditions used here.

Rate of heating is not important as long as temperature in the die is not allowed to go much above 1130° C. (At higher temperatures, extensive alloying between the steel liner and the beryllium is inevitable.) However, it is desirable to use as fast a heating rate as possible to reduce die oxidation, beryllium reactions with the atmosphere and overall operating time.

Rate of pressure application is a compromise between encouraging heat transfer through the beryllium with early application of pressure and protecting the die from high stresses by reduced pressure application before the beryllium powder has started to coalesce. Choice of 750 or 1000 psi for holding pressure depends somewhat upon die size; the lower holding pressure is recommended for dies above 6 inches in diameter. Actually, there is no indication to date that 1000 psi allows higher densities than 750 psi if the temperature is maintained at 1100° C.

Six 6-inch diameter beryllium hot pressings were made as shown in Table II. Attack on the steel liner for the first five runs was not appreciable and several of the liners could have been used again, but were not. The successful use of 750 psi pressure to give theoretical density in intermediate hot pressings is indicated.

Only three 12-inch beryllium hot pressings were made, and none was completely successful. During the first run the die temperature at the steel liner got out of control, and went 60 degrees above the eutectic temperature of the beryllium-iron system, and the liner was not plated on the inside surface. The melting-out of the liner was accompanied by fracture of the die which in turn fractured the quartz tube which happened to be already partially cracked. The beryllium powder had been at 1100° C under 1000 psi for a short time, and it was possible to salvage the run by holding at 1100° C at about 100 psi for 3 hours; the resultant pressing was of high density and a radiograph indicated a very uniform structure.

The next large die was made with an 11-inch bore to increase the wall thickness of the die. The steel liner was chromium plated on the inside in addition to the outside. During the run the temperature in the die was carefully controlled so as not to exceed the Fe-Be and Fe-C eutectic temperatures. Rate of temperature rise in the beryllium was very slow and it required 3 hours to reach 1100° C; a pressure of 1000 psi was held for 50 minutes. The die did not fail, but the liner did melt in the vicinity of the beryllium.

A third large hot pressing was made with the 11-inch die and it resulted in both die and liner failure as in the first run. Later, it was discovered that the 11-inch and 12-inch liners had been chromium plated without the usual copper and nickel underplates. It is possible that the chromium alone is not sufficient to prevent the formation of the Fe-C eutectic (the copper underplate may be necessary to prevent carbon diffusion into the steel); however, the copper and nickel probably would not be as effective as chromium was in stopping the beryllium attack on the steel liner.

In spite of the difficulties encountered in the three large hot pressing runs, the pressings were salvaged by keeping reduced pressure on the die and increasing the time, as in the first run described above. It is not clear why this difficulty with liner melting occurred so consistently with the large size compacts, while no difficulty had been experienced under similar conditions with the 6-inch pressings, unless as mentioned above, it is primarily a matter of carbon diffusion occurring because of lack of the copper underplate, thus allowing formation of the Fe-C eutectic at 1130° C. Melting of the liner which occurred in the 6-inch Clifton flake run where a copper undercoat was used seems to argue against this point of view. As mentioned above, the use of the sprayed glass coating on the metal liners gives promise of eliminating severe liner attack, but glass-coated liners have not as yet been used on the 11 or 12-inch diameter scale.

Oxygen Content of Pressed Beryllium—Since this method of hot pressing beryllium provides no controlled atmosphere for the metal powder, it might be anticipated that a large amount of beryllium oxide would be formed during the process. This does not appear to be the case; apparently most of the oxidation permitted by the rather close-fitting graphite die is restricted to the surface layers. By the time the bulk of the beryllium powder has reached a temperature where oxidation is rapid (about 800° C), consolidation must have already begun, and once begun, scale off the interior from oxygen attack.

Oxygen analyses made on three samples and on one Brush sample are shown in Table III, and were performed by the Brush Beryllium Co. These figures indicate that the oxygen content of the KAPL material falls within the commercial range of the Brush product; recent analyses received from the Brush

(*Please turn to Page 96*)

MESTA Forgings

The illustration shows a forged steel rotor shaft for a turbine driven generator installation at Grand Coulee Dam. The shaft was manufactured complete, from raw materials to finished product, in the Mesta Shops.

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Application and Use of Automatic Controls for

OPEN-HEARTH FURNACES

Priority is given to air-fuel ratio, furnace pressure, roof temperature and gas reversal. Care in the use of industrial instruments for measuring roof temperature is explained in detail. Points of difference between on-off, floating and proportional principles of control are cited

By E. WHITEHEAD

Research Engineer in charge Instrument Department

Appleby-Frodingham Steel Co., Ltd.
Scunthorpe, England

TWO factors appear to be vital in the control of open-hearth reactions: Furnace atmosphere and heat. These factors are interconnected, since the means of producing the heat also provide or have a large effect on the atmosphere in the furnace. The heat factor can be controlled by measuring the temperature of some part of the bath or furnace, and varying the fuel supply to give the desired result. The furnace atmosphere can be maintained at a definite condition by controlling the air/fuel ratio, but it is here that a major snag arises. The furnace is well known to be a leaky vessel, since air can be drawn in through undesired channels, leaky brickwork, doors, and bad joints. Such infiltration is detrimental to the control of both atmosphere and heat.

The only known way of controlling infiltration is to maintain a pressure in the furnace by means of the chimney damper or waste heat boiler fan baffles. In order to prevent all infiltration of air into the furnace, the pressure at door sill level should be not less than atmospheric, but owing to the temperature in the furnace, the pressure existing at higher levels will increase by about 0.012-inch water gage per foot height. Thus, in large furnaces, when atmospheric pressure exists at door sill level, there will be as much as 0.04-inch water gage at the top of the doors, and perhaps 0.1-inch water gage at the roof. These pressures can force large volumes of high-temperature gases out of gaps and crevices, with the result that maintenance, especially of door arches and jambs, may become unduly heavy. This calls for a compromise between theory and practice, the best being the highest pressure at the door tops that maintenance considerations allow. The infiltration that then takes place at the bottoms and sides of the doors must be accepted.

Several Controls Required—Thus control of the furnace atmosphere necessitates not only control of the fuel/air ratio, but also control of the furnace pressure, and the elimination or reduction of leakage into the checkers and uptakes.

Since reaction rates with given metal and slag analyses vary with temperature, the metal and slag temperatures should be controlled, but several factors have to be considered: The metal temperature changes slowly, slag temperature is subject to abrupt changes when additions are made, and the flame temperature is considerably higher than the melting point of the refractories (assuming the usual silica roof).

It will be appreciated that auto-

Fig. 1—Principle of proportional control illustrated by mechanism of carburetor float control

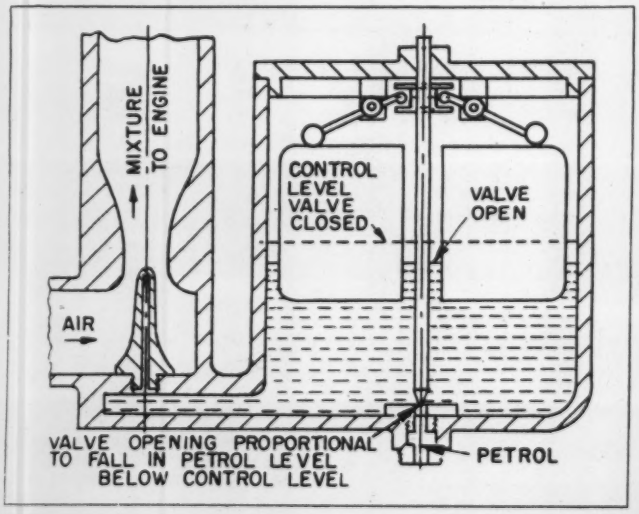
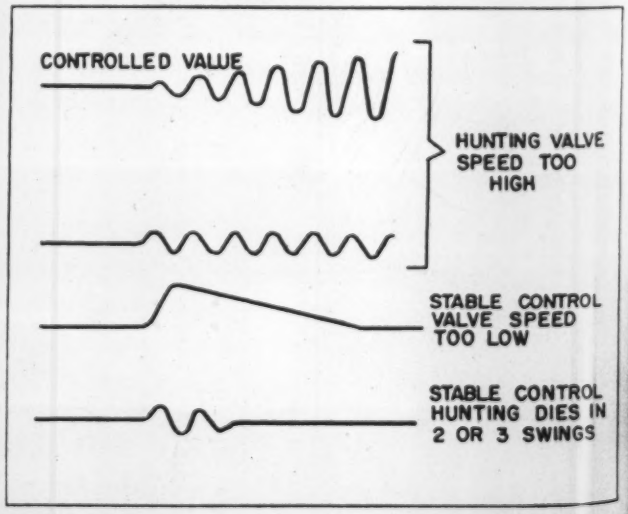
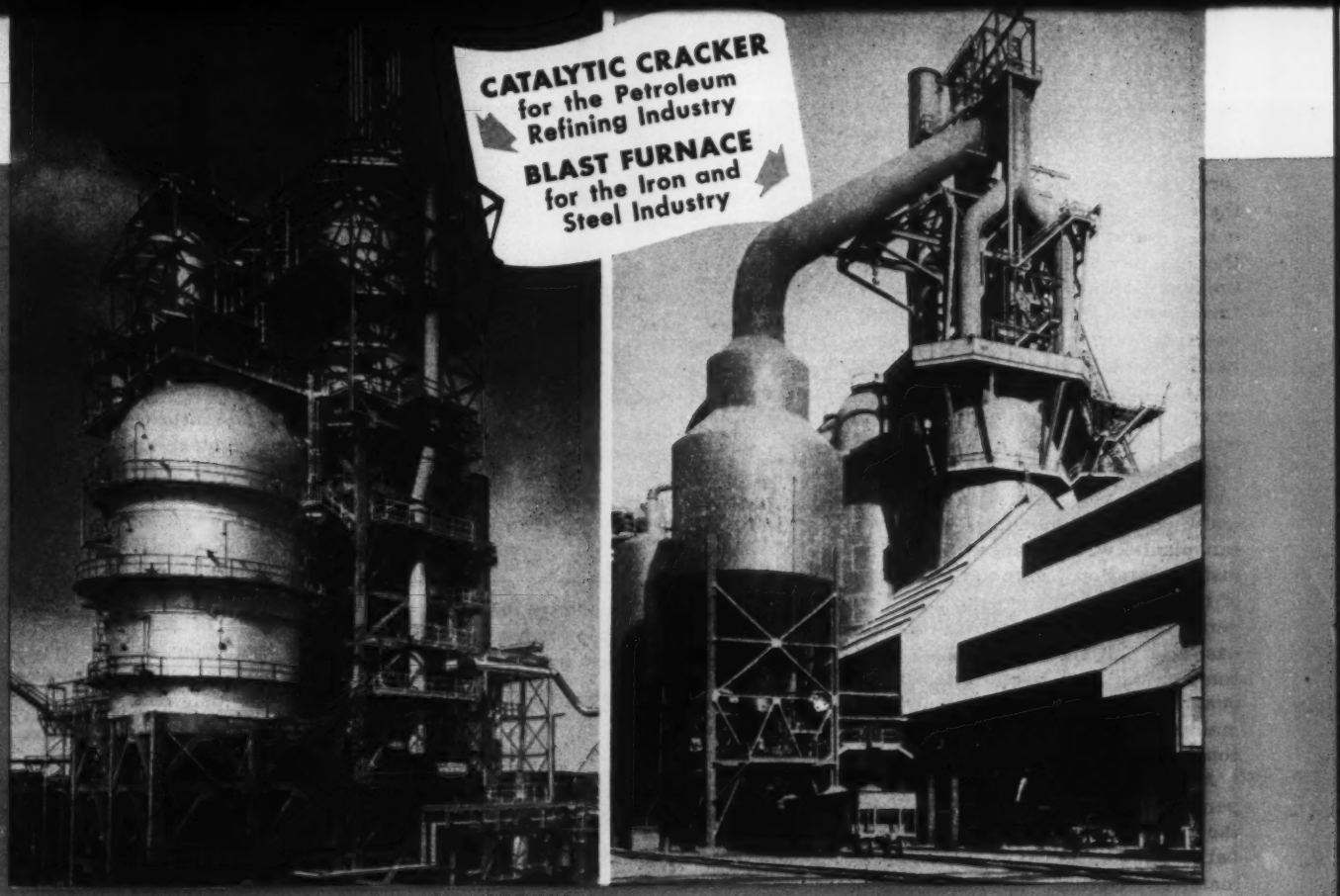


Fig. 2—Effect of valve speed on quality of control obtained with floating principle


CONTROLLED VALUE
HUNTING VALVE SPEED TOO HIGH
STABLE CONTROL VALVE SPEED TOO LOW
STABLE CONTROL HUNTING DIES IN 2 OR 3 SWINGS



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matic control of bath temperature could be maintaining full heat in the furnace because the bath temperature was low, and ignoring the fact that the furnace refractories were being burnt down. Furthermore, there is no known method of continuously measuring bath temperatures which would form a suitable basis for automatic control. Once again some compromise must be sought, and it must be considered whether the fuel supply should be adjusted by hand or automatically.

The reason for considering hand control in this discussion of automatic control is that in some American plants, well advanced in general instrumentation, automatic control of the fuel supply from the roof temperature has been given a trial, and has been ultimately replaced by a combination of hand setting for quantity, and automatic control to maintain the hand-set quantities constant.

Automatic control of roof temperature is at present considered the most useful way of controlling bath temperatures in an indirect manner. Optical, photoelectric, or radiation units, used to measure roof temperature, respond to a variety of effects:

1. The roof radiates heat and light to the measuring element;
2. It also reflects additional heat from the flame, and cold from the doors and colder parts of the furnace;
3. The furnace atmosphere radiates heat to the measuring element, although its radiating power is low compared with that of a solid body or a highly luminous flame;
4. Dust or smoke in the sighting path at a lower temperature than the roof absorbs some of the radiation and causes a low reading.

Accuracy of Controls—Thus, optical, photoelectric and radiation instruments only read correctly when sighted on a true black body, and the roof of an open-hearth furnace is by no means a black body. Allowance should be made for the inherent errors of the measurement before automatic control of temperature can be even moderately successful. The major sources of error are considered in the following paragraphs.

At present, no manufacturer (in England) will guarantee an absolute accuracy of industrial instruments better than plus or minus 2 per cent, and this guarantee only applies when the instrument is working under ideal conditions. This degree of accuracy is over and above errors caused by furnace conditions and

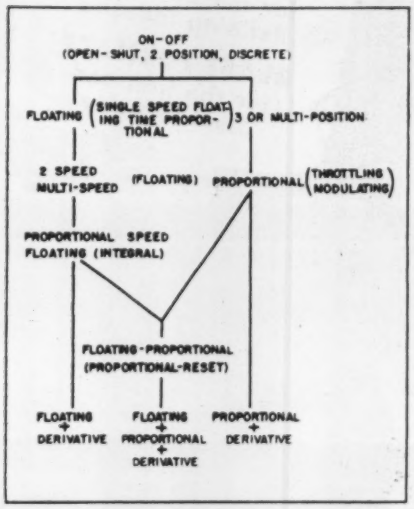


Fig. 3 — Relationship between commercial regulators on basis of principles involved

faulty methods of erection. At first sight, the fact that the measuring instrument can give a reading anywhere within a band 70° C wide and still be considered accurate, seems to rule out any possibility of close control of roof temperature, but with good maintenance, the inherent error of a well-designed instrument can be kept within a smaller range than plus or minus 2 per cent. Moreover, it is not necessary to know the true temperature at which the roof brickwork starts to melt, but that the instruments shall give approximately the same reading whenever there is a risk of damage to the roof.

It is necessary, therefore, to check regularly the radiation instrument, generally by an optical pyrometer. However, the optical instrument is inherently no more accurate than the radiation instrument, and the following precautions must be taken if the check is to be of any value:

1. The optical instrument must be frequently checked against a standard, such as a tungsten-filament strip lamp;
2. The method of checking the optical instrument must include a check on the filter screen normally used with the optical instrument for high temperature readings;
3. The radiation instrument should only be checked when the furnace conditions are fully favorable, i.e. (a) no flame should be visible in the path between the instrument and the portion of roof sighted, (b) the furnace doors should be closed, and should have remained closed for at least 5 minutes, (c) several minutes should have elapsed since the last reversal, and (d) the roof should be at, or near, the highest allowable temperature;
4. When checking the radiation instrument, the optical pyrometer must be focused on the same area of roof as is viewed by the radiation instrument.

Differences between the optical and radiation readings do not mean that the radiation instrument is wrong, but rather that the lens or screen may be dirty, or the instrument may be somewhat misaligned.

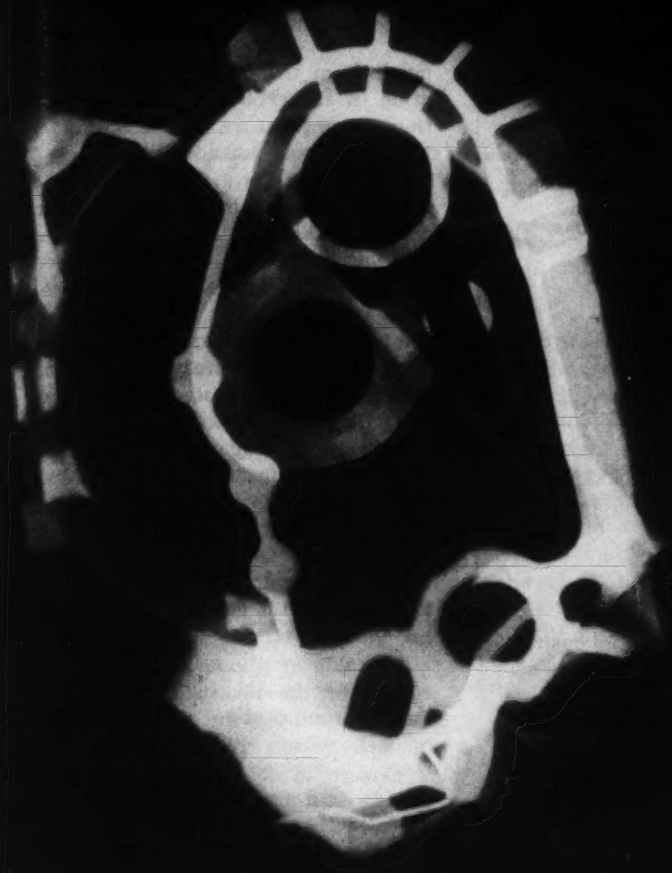
Roof Temperatures—In addition to the check against an optical instrument the actual melting point of the roof should be determined, and reading of the recording instrument noted. It is suggested that this is the only sure way of checking a roof-temperature instrument, and, to take care of any changes in the roof itself, this check should be carried out at intervals during a furnace campaign.

The most important error is that caused by radiation from the flame. With good general conditions, the flame lies low in the furnace, and it is easy to locate the measuring unit so that the sighting path is above the flame, but should anything happen to cause the flame to rise into the sighting path, big errors can arise. If the flame is bright and clear, the instrument will read high; instances have occurred where the recorded roof temperature shot up by as much as 200° C because of flame interference. Should the flame be dull, owing to shortage of air, such as during violent reactions, the instrument may read low. Under these conditions automatic control may do precisely the wrong thing, and if the particular process causes this type of error to occur frequently, it may be wiser not to embark on automatic control of roof temperature.

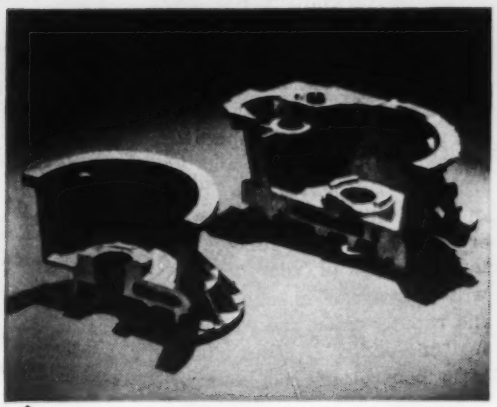
The error caused by reflection of the flame from the roof tends to be much more consistent, and can be allowed for in the calibration of the instrument. With mixed-gas firing and measuring by means of a radiation unit, the error appears to be approximately 20 to 25° C, but with fuel-oil firing it is believed to be of the order of 40° C, possibly because of the greater luminosity of the flame. This should be borne in mind when a furnace has to be fired with more than one fuel.

Errors caused by smoke or dust in the sighting path vary considerably, according to the intensity of interference. Their most important effect occurs when the measuring instrument is mounted some distance clear of the furnace wall. Dust or

From a paper presented before the Iron and Steel Institute, London.



Radiograph showing how the oil passage walls could be checked without damage to the casting.



Cutaway showing oil passage which required accurate and uniformly thick walls.

Only Radiography could check this vital specification

THIS sand cast aluminum housing for a high-altitude air pump included passages to carry oil at very high pressures. Specifications called for passage walls of accurate and uniform thickness.

There was one way to check this important specification—one sure way for the foundry to be absolutely certain of releasing only sound and satisfactory castings. Radiographic inspection was the way.

Radiography is becoming more and more routine with foundries assigned important tasks. On critical castings, such as this, it may be used to assure freedom from core shifts immediately before pouring and as a final casting inspection tool. Most valuable of all, radiography reveals internal defects during the pilot casting stage and suggests the changes needed to assure high yield in the production run.

* * *

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smoke in the gap, being at low temperature, absorbs radiation from the roof and causes the instrument to read low.

Temperature of a roof may vary appreciably over its area, but to make absolutely certain that at no point does it reach melting point would require too many instruments of the present type. It may be that an instrument can be designed to "scan" the whole area, in which case the control of fuel supply from the highest temperature observed would not present insuperable difficulties.

Air and Gas Preheats—Apart from the errors of measurement that must always be borne in mind when considering automatic control, roof-temperature measurement brings to light the importance of air and gas preheats. When gas flow, air flow, and furnace pressure are maintained at constant levels, the roof-temperature recorder shows, by a high and low record, when an unbalance exists between the checkers at opposite ends of the furnace. It follows that automatic control of roof temperature will aggravate checker unbalance and rapidly cause the furnace to become "one-ended". Thus, before automatic control of roof temperature is applied, provision must be made to maintain preheat temperatures in balance by reversal control. Reversal control can balance either air or gas checkers, but it has no effect on the relationship between them. Reversal control can be effected by time, temperature difference of checkers, or by a combination of both. It may be fully or partially automatic. Control by time is a good help to the melter, but is insufficient by itself, for it gives no corrective action when the checkers become unbalanced.

Fully automatic control of reversal has one major disadvantage: It tends to be dangerous to personnel. The semiautomatic system based on temperature difference of the checkers can be fully recommended. At our plant, difference between the air-checker temperatures is recorded and an alarm sounded when the difference reaches a predetermined figure. The furnaceman then reverses the furnace by pressing a single pushbutton switch. The checker temperatures are measured by thermocouples suspended through the roofs, and although this method gives neither true checker nor true preheat temperatures, the roof-temperature recorder confirms that it accurately reveals unbalance.

Primary requirements for an open-hearth control are robustness, simplicity of construction, ease of maintenance, and general stability. The best accuracy that can be obtained with these features should be sought. A control consists of two main parts—a measuring system and a system to apply corrective action when there is a difference between the values measured and the value required—and it is necessary to distinguish between the accuracies of these two systems.

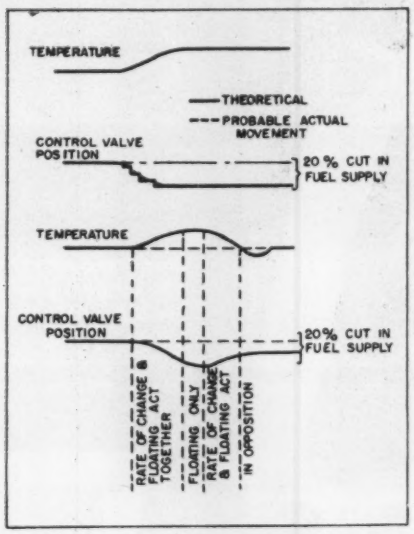


Fig. 4 (top)—Proportional control. (bottom) — Floating rate-of-change control

Pressure Measured Through Roof—It has already been shown that furnace pressure should be controlled so that the zero line is at door sill level, or perhaps a little higher, as dictated by maintenance considerations, and theoretically, measurement should be made at the zero line. In practice, this is a most inconvenient level at which to maintain a hole through the front or backwall of a furnace, and the practice of measuring the pressure through a hole in the roof is now generally accepted. The method of running the pipe connection from the point of measurement to the measuring instrument can introduce appreciable errors, owing to the "buoyancy" or "chimney" effect at all changes in the pipe level. These errors can be minimized by making the vertical part above the roof as short as possible, and by placing the down connection from roof to stage level where its temperature will not be different from that of the general atmosphere. Should this be impossible, the down connection could be water-cooled. Trouble arises not so much from the error, as from variation of the error, caused by variation in temperature.

Another recommended way of correcting the error, is to use a differential type of instrument, with a compensating pipe, side by side with the measuring-pipe connection, terminating just above the roof level. Care must be taken to ensure that the two pipes are subject to identical conditions of temperature variation, and that errors, caused perhaps by wind blowing across the open end of the compensating pipe, are not greater than in the uncompensated system. There is no known way of correcting for the buoyancy effect in the length from the lower to the upper surface of the roof other than by adjusting the zero of the measuring instrument.

The plus or minus 2 per cent accuracy of the measuring part normally guaranteed by manufacturers, is well within requirements, since a change of 2 per cent causes a change of infiltrated air flow of only 1 per cent, and it is doubtful whether a change of this order could affect the working of a charge. Indeed, far bigger changes are allowed to take place uncontrolled, as in the case of furnace doors which, when new, fit well with merely a small gap, but towards the end of a run the gap is generally much bigger. While such changes remain uncontrolled a 2 per cent error in furnace-pressure measurement is relatively insignificant, even if there is an additional 1 or 2 per cent error in the correcting system.

Standard Devices Preferred — Wherever possible, standard methods of flow measurement* should be used in preference to a makeshift method requiring a special calibration with a model. Even if new mains have to be erected, the cost is negligible compared with that of building and maintaining a furnace throughout its whole life. The normal accuracy of measurement guaranteed by makers is plus or minus 2 per cent for standard conditions. Moreover, the power available from the measuring device to operate the control mechanism is normally relatively great, so that the control mechanism adds only slightly to the inaccuracy of the measuring element. Thus, accuracy of standard commercial regulators can be accepted, particularly when it is remembered that the proportion of infiltrated air to that entering the reversing valve can be appreciable and variable.

It is regretted that there is no

(*Please turn to Page 87*)

*British standard specification, No. 1042: 1943.

Fast . . . Low-Cost

REPETITIVE SHAFT-TURNING

. . . provided by new tracer-controlled duplicating device

NEW tracer-controlled method for fast, repetitive shaft-turning at low cost was revealed recently by Monarch Machine Tool Co., Sidney, O. It involves a device combining electronic controls with basic principles of automatic sizing lathes, to increase productiveness and improve accuracy.

Essentially, the new duplicating attachment—referred to as the Motor-Trace—is a motor-powered, electrically-operated device which converts any new Monarch engine lathe of 14 inches to 20 inches into an automatic-cycle machine. According to Monarch engineers, small lots of two or three pieces can be produced with the economy ordinarily associated only with long production runs. Tracing with the unit is from gage blocks, micrometer heads or a template. Straight, multiple-diameter turning requirements can be handled in any size within the normal capacity of the lathe. The new method is also used for step-boring, step-facing. When tracing is from a template, such work as tapers, contours, radii or chamfers can be turned.

With finger-tip control of the automatic cycle from a single pedestal type station, one operator on most work can handle two machines with less fatigue than he would operate one manually-controlled lathe. Equally important, the tracing attachment is disengaged in 30 seconds or less, so the machine can be quickly converted from automatic-cycle to conventional engine lathe operation. Application of the device does not reduce lathe's normal swing capacity.

To the wide range of shaft-turning jobs, the attachment is reported to bring the following additional cost-reducing, quality-improving advantages:

(1) Time saving on lots as small as two or three pieces due to simplicity of total setup, which is made in 15 minutes, frequently much less.

(2) Accurate size control on straight multiple-diameter work without tracer being in constant contact with a template, thereby allowing use of micrometer heads, gage blocks, or a simplified flat template, which merely establish each new cross slide position as the cut progresses.

(3) When micrometer heads are used as the sizing means, preparation of either a flat or a round template is unnecessary.

(4) Accurate duplication of size from one piece to another is secured since size control depends on the machine, not the operator, thereby eliminating the need for constant checking of dimensional accuracy.

(5) Operation of two machines is handled easily by one man as he is required to do nothing more than load the lathe, start the cycle, and unload the unit; at the end of the machining portion of the cycle, carriage automatically rapid traverses back to its starting position.

(6) Extreme sensitivity of response—to a diameter change of as little as 0.001-inch.

(7) Utilization of every second of cycle to optimum advantage, because tool rapid traverses when changing from one diameter to another and at all other times except when under actual cut.

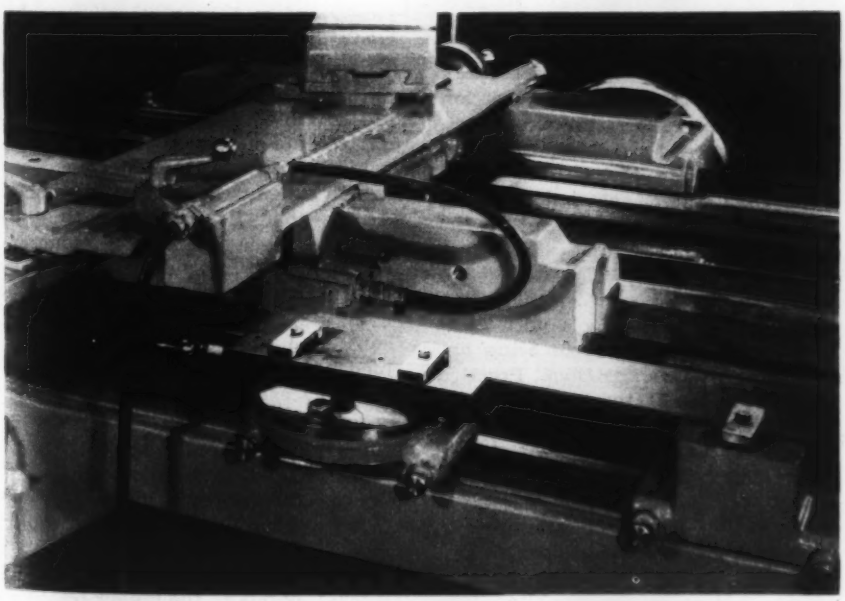
(8) Maintenance of feeds substantially as set, regardless of variation in amount of stock removal, is achieved through electronic features of the control.

(9) Preselection and automatic use of correct feed for maximum efficiency on each diameter.

(10) Provision of complete control, electrically, from point most convenient to machine operator.

Power for both longitudinal and cross movement is supplied by separate, electronically-controlled feed motors, which make available an infinite number of feeds within a range of ½ to 20 inches per minute. Rapid cross traverse and rapid longitudinal traverse left or right is 100 inches per minute. As many as five feeds may be present for automatic operation at the proper time in the cycle, and feed may be changed to traverse instantly as required. Feed remains practically constant despite load variation as electronic controls automatically maintain required speeds of feed motors.

Because it is unnecessary for the tracer to be in constant contact with a template when turning straight, multiple-diameter work pieces, the attachment makes available a variety of tracer-controlled methods. Once the slide is repositioned for the next diameter cut, it remains in that position as long as that diameter is being turned. This makes possible for tracer duplication the use of micrometer heads on very small lots which are seldom repeated; gage blocks on work to be repeated from time to time; a flat template for jobs frequently repeated because of the setup time savings or when tapers, radii or chamfers are to be turned; and a round template on shafts with or without tapers, radii or chamfers.



A flat template, required when work has tapers, radii or chamfers, is also preferred for jobs which are to be repeated frequently because it saves on setup time

Butch Learns To Lift

A 16-PAGE pocket-size safety guide for workers bearing this title is available from Bureau of Labor Standards, U. S. Department of Labor, Washington 25, D. C. It discusses basic essentials of safe lifting, including eight specific pointers on safe lifting practices. Popularly written and amusingly illustrated, it is the fourth of a series of safety pamphlets designed for industrial workers and supervisors and is available at a small charge.

OPEN-HEARTH

STEELMAKERS STRESS

Control of Bath Temperature

Temperature readings made possible by pyrometers and immersion type thermocouples minimize ladle skull formation and lead to improved pouring practice, increased mold life and a reduction in mold stool stickers. Survey on advantage of oxygen in steelmaking indicates varied opinion

PRINCIPAL subjects presented at the Chicago section meeting of the National Open Hearth Steel Committee, AIME, Del Prado Hotel, Chicago, March 8, were handled in panel discussion in which from three to five selected individuals made comments after speakers had made formal presentations. Much interesting information thus was made available to the audience of about 250.

Asserting that temperature control is important to open-hearth melting practice and quality, T. B. Winkler, Bethlehem Steel Co., Bethlehem, Pa., introduced the topic of both temperature measurements and control. He described the use of platinum-rhodium thermocouples, first designed and used by his company in 1947 and introduced into one open hearth in 1948. Utilization has since been extended to additional furnaces. The couple is 10½ feet long and is used in conjunction with a high-speed electronic recorder.

Design of the couple was improved recently to incorporate a silica tube which is cemented into a graphite plug. Maintenance of the couple thus is simplified since a new tube is inserted for each reading. Cost of each tube change is $1.20, of which 50 cents is labor. Use of the thermocouple makes it possible to tap heats at predetermined temperatures. A reading is taken about 1 hour before tapping or when the oxygen blow starts. A recheck reading is taken just before the manganese is added.

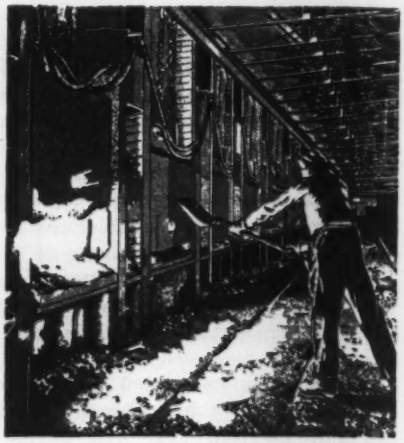
Pouring Improved — Mr. Winkler stated that control of bath temperature minimizes formation of ladle skulls; in other words, through temperature readings it is possible to tell when skulls will form. Bath temperature control also results in improved pouring practice and increases ingot mold life from 70 to 88, or 25 per cent. It is believed also that temperature control of the bath improves steel cleanliness.

In discussion, one speaker mentioned that the success of using thermocouples depends upon the operating supervisors. Another speaker emphasized that in higher carbon steels, control of temperature alone is not sufficient; other conditions of the bath must be taken into account as well.

Roger Wolcott, assistant superintendent of open hearth and bessemer, Jones & Laughlin Steel Corp., Pittsburgh, mentioned that by using a pyrometer on the bath, it has been possible to reduce stool stickers 25 per cent. Graphite inserts were shown to give an 85 per cent increase in stool life. Control of pouring temperature also provides control of the sticker problem. His company uses a special device on its ingot stripper to hold the stools down during stripping.

G. McCabe, Wheeling Steel Corp., Steubenville, O., posed the question as to what causes stickers. He observed that stickers have increased since the practice of blowing heats with oxygen was started. In his opinion, initial temperature of the stool has a bearing on the difficulty. The paper he presented described the use of specially-designed combination steel and cast-iron stools with cast-iron inserts, these inserts being approximately 12 inches thick. Practice at Steubenville is to cool molds and stools with water. The number of stickers declines, Mr. McCabe stated, when stool temperature drops to less than 100° F.

By way of discussion, one speaker said his company undertakes to control stool stickers by using cast-iron inserts coated with graphite. The coating is mixed to mud consistency and brushed on to about ⅛-inch thickness.



Stools No Problem—Still another open-hearth operator explained that each furnace in his plant has its own supply of stools, thus stools have adequate time to cool between pouring of ingots. Because of this cooling and the fact that a wash is applied to the stools, stickers present no serious problem. Another steel plant employs stools without inserts but uses three types of washes. The sticker problem is worse when pouring temperature is high, consequently this plant prefers to control stickers by controlling pouring temperature. When stickers do occur, they are broken loose by the common method of tipping the molds.

Two papers covered the use of oxygen. The first, by E. H. Reyer, open-hearth superintendent, Keystone Steel & Wire Co., Peoria, Ill., dealt with use of oxygen for carbon reduction and temperature pickup. The system which the speaker described delivers the oxygen at a rate up to 450 cubic feet per minute through a 2-inch pipe, the piping system serving all furnaces.

Injections into the bath are continued intermittently up to tapping time. Use of oxygen speeds up the reaction and permits higher tonnage to be obtained with the same equipment. A limiting factor to the practice is the increase in erosion of the brickwork due to the higher temperatures. Mr. Reyer cited an example in which use of oxygen gave an 18 per cent increase in production with

an 18 per cent reduction in fuel, though these savings were reduced by the cost of oxygen.

Progress in Oxygen—In the second paper, P. W. Nutting, Inland Steel Co., East Chicago, Ind., presented a progress report on the use of oxygen, his remarks being partially predicated on results of a questionnaire survey now being made. A full report on results of the survey will be made at the annual conference in Cincinnati, April 10-12. The two uses for oxygen are flame enrichment, or improved combustion, and decarbonization. Mr. Nutting pointed out that practically all steelmakers are using oxygen or experimenting with it. Some plants are pleased with results but have discontinued the use. One of the disadvantages appears to be the high cost of brickwork.

Several matters in the use of oxygen are controversial. One of these is that too high a temperature is derived. Concerning this, the speaker believed that temperature can be kept under control. Opinions differ concerning effectiveness of oxygen in sulphur removal. It was the feeling of Mr. Nutting that oxygen does contribute aid. In one instance, sulphur was reduced in one-half the time normally required.

It is believed by some that use of oxygen increases deposits in the slag pockets and decreases refractory life. Opinion of the speaker was that there is no increase in deposits. Formerly it was true that roofs were burned but that seldom happens now under controlled practice.

Future of Oxygen—As to the future of oxygen use, Mr. Nutting stated that the practice is not economical as matters in the steel industry now stand. Something must be done in the manner in which oxygen is used in decarbonization to eliminate the congestion which arises on the open-hearth floor near the end of a heat. In concluding his remarks, the speaker emphasized that use of oxygen has now moved from the experimental sphere to that of a steelmaking tool and in this transition it has not revolutionized the industry as was predicted.

During the panel discussion, one speaker said his company began in 1947 to use oxygen for decarbonization. Experience has shown that the procedure is more practical in heats containing under 0.30 per cent carbon.

Another commentator stated that his company is conducting broad-scale experiments on open-hearth combustion and operation. The work includes the injection not only of oxygen, but air and nitrogen as well; furthermore injection pressures are being varied. In one set of tests using oxygen, it was found that roof life dropped from approximately 230 heats to 130 heats. An effort now is being made to mechanize the introduction of oxygen into the back of the furnace, this to relieve the congestion which occurs on the open-hearth floor.

Open Hearth Furnaces

(*Continued from Page* 80)

positive recommendation for the accuracy required for roof temperature control, but it is suggested that, in view of the many sources of error in the measuring systems used today for the purpose, too high a degree of accuracy should not be expected.

Whether reversal is based on time or temperature, the accuracy of modern instruments is adequate. A true temperature measurement is not necessary when reversal is based on temperature, since the temperature of one checker is being compared with that of another, and although plus or minus 2 per cent is the generally accepted standard of accuracy for measuring temperatures, much better accuracies of comparative temperatures are easily attainable.

Regulator Principles—Three basic principles are to be considered in commercial regulators: On-off and floating, proportional, and rate-of-change.

If these are thoroughly understood there should be little difficulty in recognizing and understanding the many variations that appear.

On-off and floating control signifies that corrective action is taken whenever a deviation from the desired condition takes place, and no account is taken of the extent of the deviation.

On-off control is analogous to a room thermostat controlling the temperature of a room by switching on or off the current supplied to a radiator. Variations in room temperature cause the thermostat to open and remake in repeating cycles, giving a rhythmic variation of the controlled value, a feature which is known as "hunting", and which is common to on-off control.

The essential difference between on-off and floating control is that the former makes corrective action abruptly and between two distinct limits, and the latter acts relatively slowly and continuously so long as the deviation exists. This system also gives a so-called hunting type of control.

Proportional control takes its name from the fact that the correcting device causes the control valve or damper to take up a position proportional to the extent of the deviation of the measured value from that desired or set. One of the simplest illustrations of this principle is furnished by the float chamber of a carburetor of a petrol engine as seen in Fig. 1.

This principle has a pronounced antihunting effect, for no matter how fast the deviation or the correcting action takes place the control element cannot get out of hand, but will hold the control valve in the position corresponding to the deviation until a further deviation takes place.

The rate-of-change principle consists of measuring the rate at which the controlled value changes, and varying the corrective action accordingly; so that should the controlled value change rapidly a large corrective action would be made.

Unlike on-off, floating, and proportional, the principle of rate-of-change cannot by itself form the basis of a control, but must be applied in conjunction with either, or both, the floating and proportional principles. When correctly applied, its action may be considered as somewhat anticipatory in that it is theoretically possible to measure the rate-of-change as soon as the controlled value starts to change. It tends to give faster control than floating or proportional control, but it has only an indirect antihunting effect.

The term hunting is only applied to the rhythmic variation set up entirely by the control mechanism, so that when the performance of a given regulator is being considered care must be exercised to differentiate between possible hunting of the control and the results of external influences.

Lags Determine "Hunting"—The probability of hunting is determined by the various time lags in the control system, a simple case being that of controlling the pressure of gas supplied to a furnace. This system will consist essentially of a valve some distance from the furnace, a pressure measuring point between the valve and the furnace, a pipe connection from the measuring point to the control, and some linkage between the control and the valve. When the gas supply to the furnace is increased by the furnaceman operating his valve, the pressure be-

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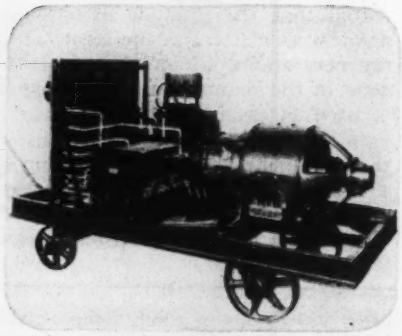
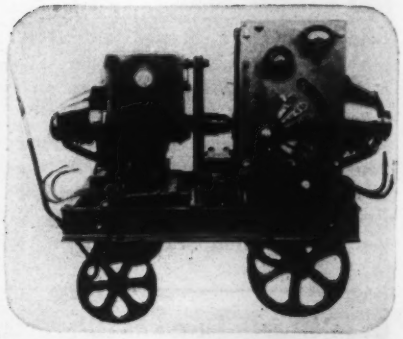
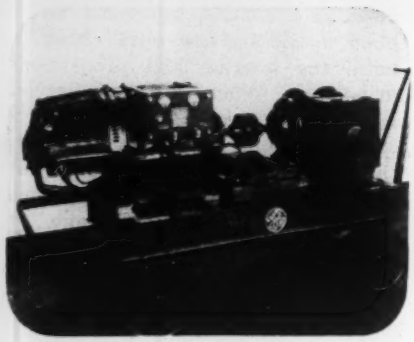
All prices and data are based on standard 300-amp d-c welder, complete with mounting base, but *excluding* running gear.



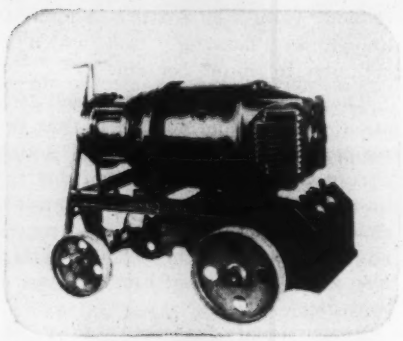
1911—This early d-c welder weighed close to 3400 pounds assembled. Individual components were priced separately.



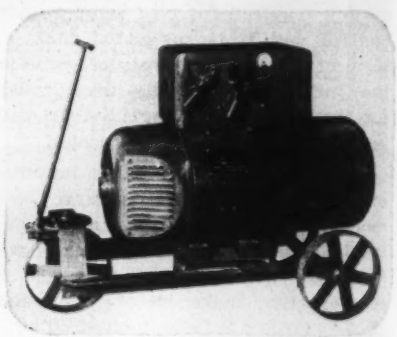
1918—This motor-generator welding set tipped the scales at 3185 lbs. Complete set was priced at $1220.



1927—Weight was down to an even ton by now, but equipment was still comparatively large and unwieldy. Price—$850.

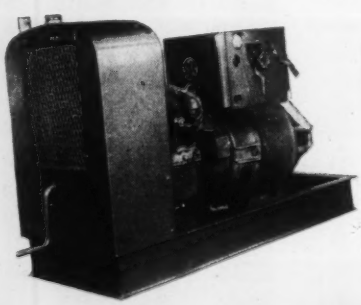


1930—Much more compact, but still weighed 1665 lbs. Price—$730.



1934—Weighing 1435 lbs., this model sold for $660.

ENGINE-DRIVEN WELDERS, TOO . . .

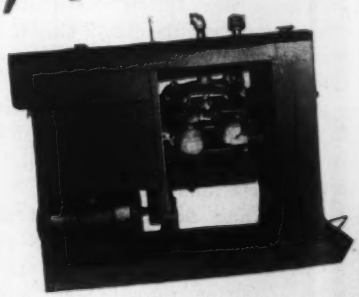


← IN 1939

This liquid-cooled (Hercules) engine-driven 200-amp d-c welder sold for $740, weighed 1220 lbs.

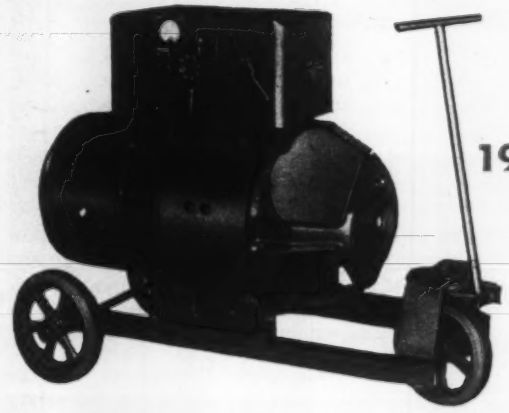
TODAY →

This 1950 200-amp welder, again with Hercules engine-drive, is 300 lbs. lighter for increased portability . . . gives superior welding performance . . . price—$725*.



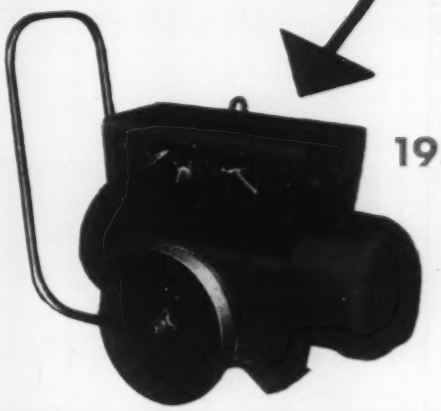
at 1940 prices

Today's G-E WELDERS give you 5 major improvements—for less money



1940

1940—This standard 300-amp d-c welder weighed 1310 lbs., *priced at $435,* exclusive of running gear.



1950

1950—This latest Type WD-43 300-amp d-c welder weighs just 650 lbs., *price—$425 (exclusive of running gear).**

1950 G-E welders give you many points of superiority, including these five major advantages:

1. Superior overall welding performance; hard-working arc is exceptionally stable, easily controlled.
2. General Electric's exclusive single-dial dual control for precise current control combined with complete flexibility and ease of operation.
3. 50% savings in size and weight; functional design has eliminated excess "dead-weight" with no sacrifice in quality or performance.
4. Easy, inexpensive maintenance; all you need is screwdriver and pliers.
5. Steady, dependable service over a long "life span."

Yes, General Electric welder design, performance, appearance have been continuously improved during the past ten years. With all these improvements for less money than pre-war, you just can't lose with a 1950 General Electric welder. Consult your nearest G-E Welding Distributor to determine the type and rating of welder best suited to your requirements; he can give you immediate delivery on all standard models. If you don't know him, write us for his name and address: **Apparatus Department, General Electric Company, Schenectady 5, New York.**

*Prices are manufacturer's suggested retail prices.

ARC WELDERS • ELECTRODES • ACCESSORIES • RENEWAL PARTS

You can put your confidence in

GENERAL ELECTRIC

tween that valve and the control valve decreases at a rate proportional to the cubic capacity of the main between the two valves. If the capacity is large the time lag is also large.

The next lag is that of the pressure pipe and measuring element, followed by the lag between the regulator noticing the change of pressure and the start of the corrective movement of the control valve, and finally, the lag between the movement of the control valve and the change of pressure at the measuring point. If any or all of these time lags are large there is always the possibility of hunting. Mathematical formulas have been developed, based on measured values for these lags, relating the possibility of hunting to the speed of operation of the control valve, when operated by a simple control of the floating type, and it has been found that for a given installation there is a limiting speed, below which the control is stable, owing to the system being self-damping, the hunting set up by a given change automatically dying out, Fig. 2.

An explanation of the self-damping effect is that if the capacity between the two valves is small, the pressure stabilizes itself almost instantaneously at a new value when the furnaceman's valve is changed. All the controller has to do then is to return the pressure to the control valve, and because the capacity is small the pressure instantaneously "follows" the movement of the control valve. When the set-point is reached the control valve stops and there is no "overshooting".

In the past, many variations of the on-off and floating principles have been developed to overcome their natural hunting tendencies. For instance, the on-off type control has been modified to allow the control element to take up three or more positions, according to the extent of the deviation. In this way, it becomes a crude proportional control.

The simple floating principle has been modified so that the control mechanism can operate at two or more speeds, depending on the extent of the deviation, a small deviation causing the corrective action to be slow, and a large deviation causing rapid action. A further refinement is to make the speed of corrective action infinitely variable and proportional to the extent of the deviation. Thus it is possible to change a large deviation to a small one relatively quickly, but if the time lags of the system are large, slow speeds must be used in correcting small deviations to avoid hunting. Fig. 3 indicates how commercial regulators are related according to the fundamental principles involved, and gives some of the alternative titles in common use.

Comparison of Controllers—The statement made previously, that the rate-of-change principle has only an indirect antihunting effect, may be questioned, but it is interesting to compare the actions of a proportional controller and a floating and rate-of-change controller for maintaining a furnace at constant temperature. Assuming that the furnace has been working under constant conditions requiring a particular rate of fuel supply, and that those conditions change in such a way as to require a new rate of fuel supply, say a reduction of 20 per cent, a proportional control would start to operate as soon as the temperature rose sufficiently to be noticed by the control (determined by its sensitivity), but would only make small corrections proportional to the deviation until such time as the fuel supply was reduced by the requisite 20 per cent when the temperature would no longer rise; top, Fig. 4. This would happen irrespective of the rate at which the temperature rose, so that the 20 per cent reduction would be made in the time taken by the furnace to increase its temperature to the extent corresponding to the 20 per cent cut. This explanation presupposes that the regulator moves quickly.

A floating and rate-of-change controller starts to operate when the temperature rises by the amount corresponding to the sensitivity, but, according to the rate at which the temperature rises, the controller tends to overshoot the required correction of 20 per cent reduction, in which case it has to increase the fuel later, until the new position of equilibrium is attained. There is another way of looking at the action. When the furnace temperature is rising, both the rate-of-change and the floating principles act together to reduce fuel supply, but the temperature continues to rise until the 20 per cent cut has been reached. At this moment the rate-of-change element ceases to have any effect, but the floating element still maintains its action of reducing the fuel supply as shown in Fig. 4, bottom. Over-correction must occur, but extent will depend upon the limitations of the control and the skill and knowledge of the instrument engineer when "tuning" the control to the characteristics of the furnace. In fact, it may be said that over-correction is made deliberately to prevent large deviations, but if hunting is to be avoided the final rate of approach to the set-point must conform with the self-damping conditions of the system.

In taking measures to avoid hunting:

1. A floating control must be tuned to operate slowly enough to conform to the self-damping conditions of the whole system;
2. A proportional control should operate at a high rate, and its range of proportional band (deviation corresponding to full-travel of the controlled valve) should be sufficiently wide;
3. A floating and rate-of-change control, like the simple floating control, must be tuned to give the final approach to the set-point at the speed dictated by the self-damping conditions.

In some controls the proportional principle is used in conjunction with floating or with rate-of-change, and it is interesting to note that floating-proportional controls, in which the combined effect is obtained by a dashpot by-passed with a needle valve, also include a rate-of-change element somewhat by accident. At high rates-of-change the effect of the proportional element is large and that of the floating element small, and at low rates-of-change, the reverse takes place.

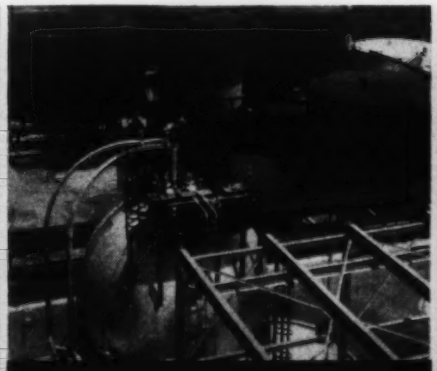
Self-Damping Conditions — The proportional principle is necessary when the self-damping conditions demand slow speeds of operation of the control valve. For example, the time lag involved in roof-temperature control is so large that, with floating control only, the rate of operation of the fuel-supply valve would have to be impossibly slow to avoid hunting.

In the following, consideration is given to the automatic control of: Furnace pressure, air/fuel ratio, and roof temperature. The automatic control of reversal is in a different class, and presents no major theoretical difficulties.

Furnace pressure and air/gas ratio control usually provide little chance of hunting, as the time lag between movement of the control valve and the resulting change at the point of measurement is, or should be, small. The self-damping effect of the system is thus large, and a properly designed floating control will normally give sufficiently fast control without hunting. The term "properly designed" implies:

1. Measuring element sufficiently sensitive;
2. Time lag as small as possible between a change at the meas-

No-Ox-Id "A Special" guards dome and base of 3-million gal. water tank against corrosion.



Weather-resistant No-Ox-Id Resinous Coatings protect exterior metal surfaces from rust.

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The answer is a simple one—prevent rust and corrosion by coating all metal surfaces with the *correct* NO-OX-ID.

There is no such thing as a single "cure-all" preventive of rust to fit every requirement. The Dearborn Chemical Co. has prepared a complete line of NO-OX-ID rust preventives to meet every industrial requirement. By using the *correct* NO-OX-ID for each job, you assure maximum protection for your plant, for your product.

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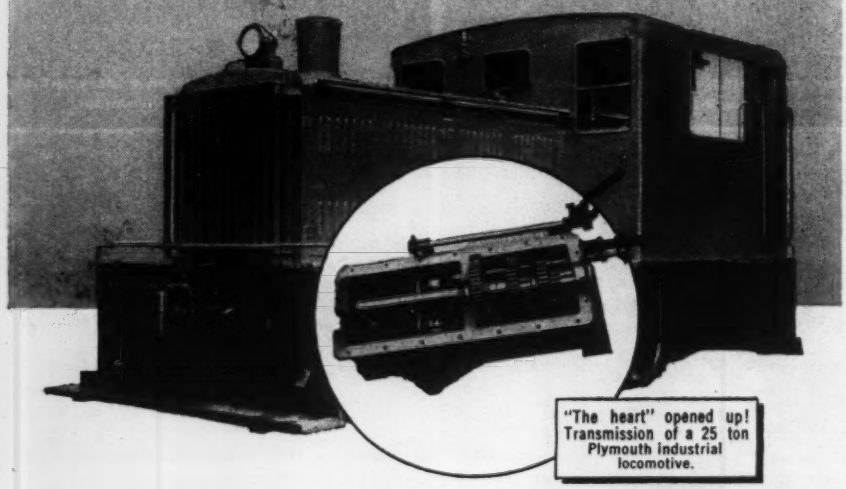

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uring point and the start of the corrective action;

3. Corrective device sufficiently powerful to operate the control valve or damper smoothly and positively;
4. Robust construction to withstand the vibration, shocks, and atmosphere likely to be met.

At our works there has been no difficulty in obtaining conditions of self-damping for: Gas pressure controls for blast-furnace and coke-oven gas supply, air/gas ratio, and furnace pressure.

Control of roof temperature is a vastly different problem, since the time between the change in the rate of fuel supply and the change in the roof temperature is so much greater. For example, when the quantity of coke-oven gas supplied to a furnace has been changed by 33 per cent the roof temperature has been observed to take about 10 minutes to rise to the correspondingly higher level. On the other hand there are times, as when foaming occurs, when roof temperature is said to rise to the danger point and above at a much faster rate. From this it can be concluded that:

1. Proportional control is essential to avoid hunting;
2. If other conditions show that the necessary width of the proportional band introduces a risk of damage to the roof, or will not allow the furnace to work as fast as possible, then the floating and proportional principles must be combined;
3. Although a floating-proportional control may meet requirements, there is a possibility that the rate-of-change element may have to be incorporated in order to obtain the fastest correction of deviations from the set-point.

Industrial Water Standards

VARIOUS ASTM standard methods of sampling analysis and testing of industrial water are compiled in a 142-page bulletin, available from American Society For Testing Materials, 1916 Race St., Philadelphia 3, Pa. Included are 26 methods which cover sampling, analysis, corrosivity tests, methods of reporting and general testing methods.

These have been developed particularly for the examination of water employed industrially in the generation of steam or for process or cooling purposes and for the examination of deposits formed from such waters. Also available is a round table discussion of a need for standards for the examination of water borne industrial wastes. The ASTM committee is described and different problems in the field are covered.

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FOLLANSBEE COLD ROLLED STRIP feeds right from the coil into your automatic machines. There's real efficiency and time-saving economy in the continuous supply of presses, roll-formers, and other automatics. These high-speed machines need never starve for material because you can feed Follansbee Cold Rolled Strip directly from the coil.

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FOLLANSBEE COLD ROLLED STRIP is manufactured in a range of tempers, and with the proper finish, for making turners, mixers, beaters, and a myriad other profitable specialties. Custom-made Follansbee Cold Rolled Strip, in continuous coils, is furnished to your specifications. You should be taking advantage of the machining quality of Follansbee Cold Rolled Strip and Follansbee Polished Blue Strip. Just call the Follansbee Steel Representative nearest you.

Production Economies

(*Concluded from Page 70*)

they will be attracted to the part which we wish to cover with paint.

A few problems are involved that will make even an engineer sit up and take notice. The paint globules are not choosey as to where they go as long as the destination is grounded. So they go to the sides of the paint booth, the roof, the floor, the conveyor, and even back to the spray gun itself.

Weight of the globule of paint is proportional to the cube of its diameter, but the amount of the charge is proportional to the square of the diameter. Therefore, the scheme is most effective when the paint is finely atomized. That requires a high air pressure at the gun and a large volume of air. That tends to blow the paint past the work into the water curtain and up the stack. Also, a large volume of air and high air velocities create high evaporation rates of the paint solvent, so that the paint tends to dry before it lands on the work. Some of the pigments in the paint seem to be long and narrow particles and when they land on the work they hit like an arrow going into a target. Hence, the color has a different shade than when it is put on in the conventional manner.

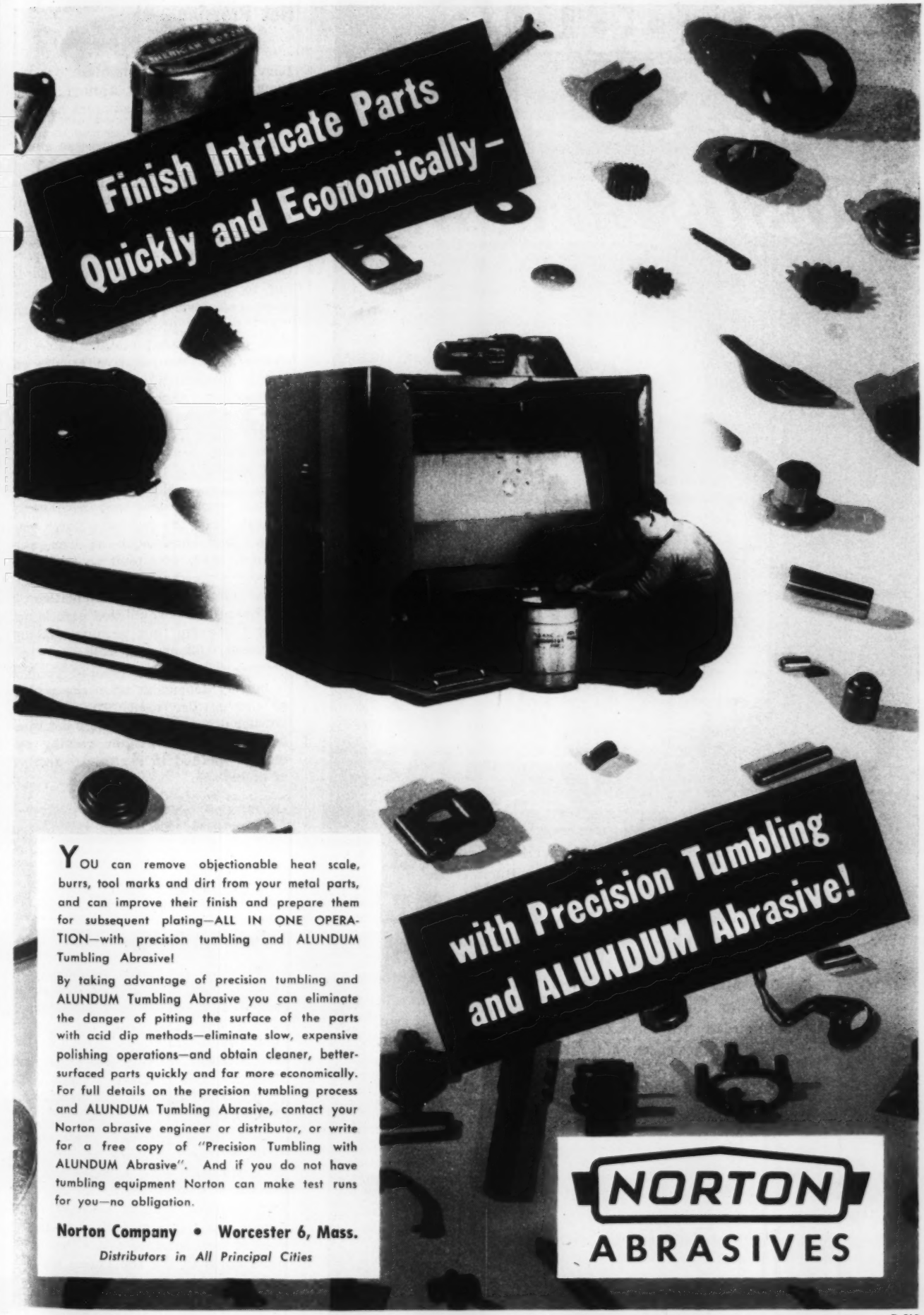
The high voltage required makes the spray booth a "No Man's Land", and precautions must be made against personal injury and fire.

But there are some advantages that make the effort seem worthwhile. On long narrow parts we have painted twice as many parts per gallon of paint. The operation is mechanical and requires no one in the paint booth itself. Thus, the operator need not have the skill required of spray painters. Interruption to production due to the illness or layoff of skilled gun spray men can be eliminated. Labor cost is reduced on operations where large volumes of work can be put through the system. Cost of paint may prove to be less if less expensive solvents can be used and if less solvent is required.

The paint covers the areas better, goes to the back side of the part, inside the flanges of channels sections, and tends to coat the part completely.

Wet Tool Grinder Folder

A SELF-ADJUSTING friction roll drive is employed by the Friction-Matic wet tool grinder, described in a folder offered by the manufacturer, Boice-Crane Co., Toledo, O. Constant wheel rim speed is maintained as the wheel wears and no water is thrown on the operator, the booklet states.


Finish Intricate Parts
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with Precision Tumbling
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YOU can remove objectionable heat scale, burrs, tool marks and dirt from your metal parts, and can improve their finish and prepare them for subsequent plating—ALL IN ONE OPERATION—with precision tumbling and ALUNDUM Tumbling Abrasive!
By taking advantage of precision tumbling and ALUNDUM Tumbling Abrasive you can eliminate the danger of pitting the surface of the parts with acid dip methods—eliminate slow, expensive polishing operations—and obtain cleaner, better-surfaced parts quickly and far more economically. For full details on the precision tumbling process and ALUNDUM Tumbling Abrasive, contact your Norton abrasive engineer or distributor, or write for a free copy of "Precision Tumbling with ALUNDUM Abrasive". And if you do not have tumbling equipment Norton can make test runs for you—no obligation.
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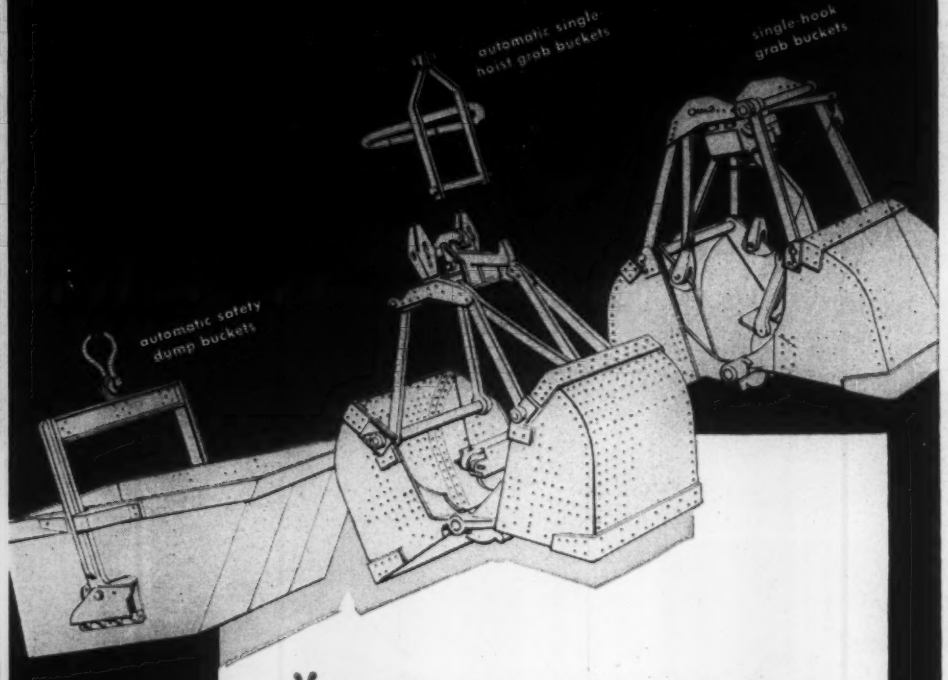
dependable*

is a word to describe

BROSIUS BUCKETS



*Dependable means trustworthy or reliable, all of which aptly describes Brosius Buckets, and here's why: Brosius Buckets are sturdily built of heavy steel forgings, castings and plates and all parts are oversized for extra wear. Design has been purified to the point of maximum practicality and simplicity of operation. Many Brosius Buckets have been in operation for more than thirty years and they aren't ready for replacement yet. If you want a bucket you can depend on to suit your purpose and last your lifetime, write to Brosius for details and prices.

Edgar E. BROSIUS

Hot Pressing

(*Concluded from Page 74*)

Beryllium Co. on "premium" metal show an average of around 2 per cent BeO, with some samples as high as 3 per cent.

Since no oxygen analyses are available on the metal powder used in the experiments, there is no information on the amount of oxygen added during hot pressing, but it does not appear to be large.

Tensile Properties—Tensile properties of beryllium hot pressed according to the technique outlined above compared favorably with the Brush "QT" powder product and the vacuum cast extruded metal. Table IV shows some comparative results on tensile properties of various grades of beryllium annealed for 1 hour at 800° C. The figures given are, in nearly every case, the average of three tests.

It should be pointed out that the term "theoretical density" freely used in this report does not necessarily indicate that the per cent pores was zero. Impurities such as iron, aluminum, BeO, etc. tend to raise the density somewhat, although the combined effect of such impurities in the quantities encountered here is not very important, but perhaps amount to about 0.02 density unit.

Cleanliness of the pressed product is largely dependent upon the quality of the powder used. However, the powder process can probably not compete with the vacuum casting extrusion method in regard to absence of inclusions.

ACKNOWLEDGMENT

The valuable assistance of the following people is gratefully acknowledged: Robert Gray for his painstaking work in setting up and operating the hot pressing equipment, and Margaret Pohl for her skilled metallographic preparation. The authors also wish to thank N. V. Bass of Brush Beryllium Co. for BeO analyses made on some of the compacts.

Strong But Lighter

DESIGNED for rough handling, easy cleaning and long service are stainless steel chemical containers developed by Steel Cooperage Co. Division, Industrial Stamping & Mfg. Co., Detroit. Made of Armco 304 stainless steel, the Lee containers have a capacity of 15 gallons, yet weigh only 27 pounds.

Reduced weight and small dimensions of the container as compared with standard acid carboys are said to reduce freight costs. In one case the reported freight savings on a single round trip amounted to 16 per cent of the container cost. Depressed hand holds in the top chime and the light weight are said to make the containers easy to handle.

CALENDAR
OF MEETINGS

Mar. 28-31, Society of the Plastics Industry: Fourth national plastics exposition, Navy Pier, Chicago. Society headquarters are at 295 Madison Ave., New York.

Mar. 29, Material Handling Institute Inc.: Meeting, Hotel Cleveland, Cleveland. Institute headquarters are at 1108 Clark Bldg., Pittsburgh.

Apr. 3-4, Association of Iron & Steel Engineers: Spring conference, Birmingham. Association headquarters are in the Empire Bldg., Pittsburgh.

Apr. 4-7, National Association of Corrosion Engineers: Sixth annual conference, Hotel Jefferson, St. Louis. Association headquarters are in the Milam Bldg., Houston.

Apr. 5-7, Midwest Power Conference: Sponsored by Illinois Institute of Technology and 18 universities and professional societies, at Sherman Hotel, Chicago. Conference director is Roland A. Budenholzer, Illinois Institute of Technology, 3300 S. Federal St., Chicago.

Apr. 5-7, American Institute of Electrical Engineers: Second conference on electric welding, Rackham Educational Memorial Bldg., Detroit. Institute headquarters are at 33 W. 39th St., New York. Co-operating societies: American Welding Society, Industrial Electrical Engineers' Society of Detroit.

Apr. 10-12, Iron & Steel Division, AIME: 33rd annual conference, Netherland Plaza Hotel, Cincinnati. AIME headquarters are at 29 W. 39th St., New York.

Apr. 10-12, American Society of Lubrication Engineers: Annual convention and show, Hotel Statler, Detroit. Society headquarters are at 343 S. Dearborn St., Chicago.

Apr. 10-14, American Society of Tool Engineers: Industrial exposition, Philadelphia Convention Hall, Philadelphia. Society headquarters are in the ASTE Bldg., 10700 Puritan Ave., Detroit.

Apr. 11-12, American Zinc Institute: Meeting, Hotel Statler, St. Louis. Institute headquarters, 60 E. 42nd St., New York.

Apr. 12-14, National Petroleum Association: Meeting, Hotel Cleveland, Cleveland. Association headquarters are in the Munsey Bldg., Washington.

Apr. 12-14, American Society of Mechanical Engineers: Spring meeting, Hotel Statler, Washington. Society headquarters are at 29 W. 39th St., New York.

Apr. 13-14, American Machine Tool Distributors' Association: Meeting, Edgewater Beach Hotel, Chicago. Association headquarters at 505 Arch St., Philadelphia 6.

Apr. 14-15, Ohio State Welding Engineering Conference: Conference on economy in design and production. Make reservations with sponsor, welding engineering department, Ohio State University, Columbus 10. Downtown headquarters at Fort Hayes Hotel, Columbus.

Apr. 17-19, Society of Automotive Engineers: Aeronautic meeting and aircraft engineering display, Hotel Statler, New York. Society headquarters are at 29 W. 39th St., New York.

Apr. 19-21, American Society of Civil Engineers: Spring meeting, Los Angeles. Society headquarters are at 33 W. 39th St., New York.

Apr. 19-22, Electrochemical Society: Annual meeting, Hotel Statler, Cleveland. Society headquarters at 235 W. 102nd St., New York 25.

Apr. 23-27, American Ceramic Society: Annual meeting, Hotel Statler, New York. Society headquarters at 2525 N. High St., Columbus 2, O.

Apr. 24, Packaging Machinery Manufacturers Institute: Semiannual meeting, Hotel Sheraton, Chicago. Institute headquarters are at 342 Madison Ave., New York.

Apr. 24-26, American Mining Congress: Coal convention, Netherland Plaza Hotel, Cincinnati. Association headquarters in Ring Bldg., Washington 6, D. C.

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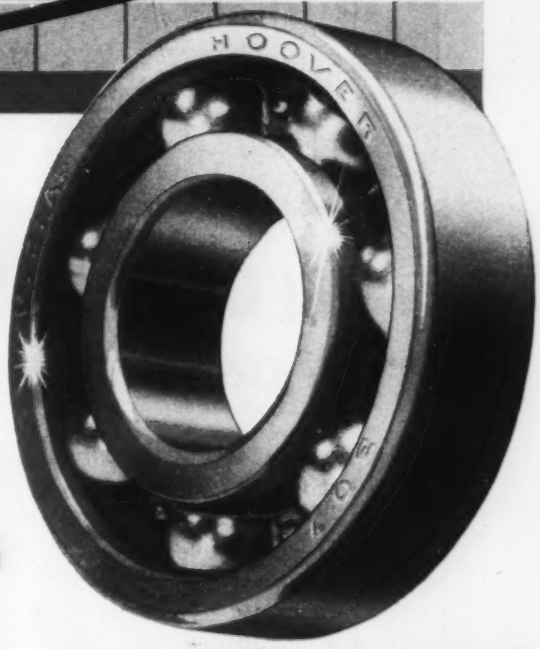

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Clearing presses are playing a big part in that kind of cost determination. This big double action press, photographed in the plant of Ford Motor Company of Canada, Ltd., is just one example. Production speed, accuracy of output, long die life, low maintenance costs . . . Clearing presses have what it takes to make cost sheets look mighty good.

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LETTERS
to the Editors

84 Vending Machine Makers

In your Feb. 27, 1950, issue you have an article on the vending machine industry. Would it be possible to obtain the names of the 84 companies in the 1947 census of manufacturers? Subject companies list vending machines as their primary product.

W. P. Cooper
Roll Formed Products Co.
Youngstown, O.

Forty-five of the companies list vending machines as their primary product; the other 39 have other products which make up more than half of the value of their shipments, and therefore list automatic merchandising machines as secondary products. We are unable to furnish the names of the companies, but the National Automatic Merchandising Association, 7 S. Dearborn St., Chicago 3, Ill., has such a list in its 1950 Buyers' Guide, which lists specific types of vending machines. Cost of guide is $2.—The Editors

Replaced

It may be that you can help me in connection with one of the articles you published some time ago—one of the series having to do with the manufacture of iron and steel. The particular one that I have reference to described the manufacture of metallurgical coke. I clipped it at the time and thought that I had filed it. Being unable to find it in my file, and wanting to refer to the article, I would be very much obliged if you could send me a reprint.

J. L. Bray
Professor of Metallurgical Engineering
Purdue University
Lafayette, Ind.

Tearsheets of the article on metallurical coke, which appeared in the May 2, 9 and 16, 1949, issues, are being sent. All of the chapters in the Fundamentals of Steelmaking series are available at 20 to 75 cents per reprint. Address: Readers' Service Dept., STEEL, 1213 W. Third St., Cleveland 13, O.—The Editors

NTDMA and NAMA

There are two associations shown in recent issues of STEEL, and if possible we would appreciate it if you could give us the local address of each. One is the National Tool & Die Manufacturers Association, as shown on page 57 of the Feb. 20th issue, and the other is the National Automatic Merchandising Association as shown on page 33 of the Feb. 27th, 1950, issue.

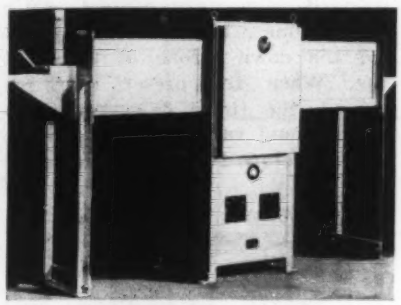
J. H. Green
Pittsburgh Tool Steel Wire Co.
Monaca, Pa.

The NTDMA is located in the Union Commerce Bldg., Cleveland 14, O., while the NAMA is at 7 S. Dearborn St., Chicago 3, Ill.—The Editors

New Products and Equipment

Fast Cycle Firing Kilns

Production test runs may be speeded up with a small tunnel kiln announced by Harper Electric Furnace Corp., Niagara Falls, N. Y. Design permits variations in firing cycles to allow duplication of most firing schedules. These schedules may



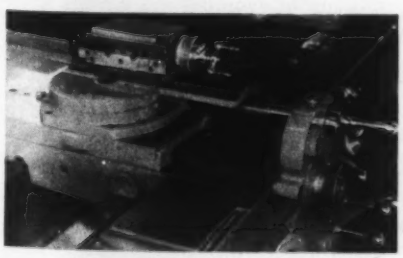
be established at a low first cost of equipment, thus reducing rejections on production runs.

Kilns may be used in test firing of ceramic powders, steatite, electrical porcelain, insulators, resistors, spark plugs, grinding wheels, electronic components and other ceramic products.

Check No. 1 on Reply Card for more Details

Ball Turning Rest Improved

Setup is considerably simplified and application to the machine made more rapid with the improved design ball turning rest for 14, 16 and 20-inch series 60 engine and toolmakers' lathe, manufactured by Monarch Machine Tool Co., Sidney, O. Regular bottom slide may be positioned either on center for ball turning or boring,



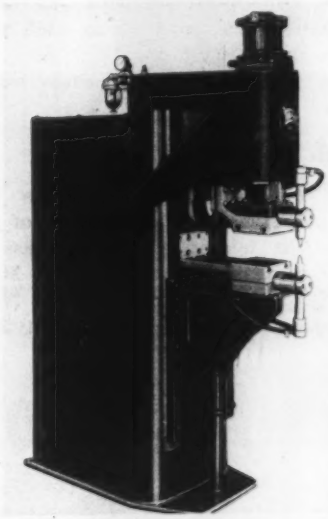
or out of alignment with the spindle for spherical radius turning. A micrometer dial adjusts the bottom slide in or out. Ball or radius diameter being turned may be controlled accurately by means of a similar micrometer adjustment.

With the new ball turning rest, a 4-inch diameter ball may be turned on the 14-inch series 60 lathe, a 5¾-inch diameter ball on the 16-inch machine and a 6 inch diameter ball on the 20-inch unit. With a 1-inch raise, the 16-inch lathe is capable of turning a 7⅝-inch diameter ball. Boring a socket is also performed effectively with the improved rest design. Maximum size is 4 inches on 14 and 16-inch machines, and 6 inches on a 20-inch unit.

Check No. 2 on Reply Card for more Details

Air-Operated Projection Welders

Ability to provide fast action, more accurate work and longer service life is incorporated in the line of press type, air-operated projection and spot welders, produced by Banner Mfg. Co., 4934 N. 29th St., Milwaukee,



Wis. Machines are built in sizes ranging from 50 to 150 kva. Roller head is air-operated and quill is guided by eight rollers mounted on the gib.

All air line equipment is mounted on top of the unit for accessibility. An extra heavy-duty transformer, equipped with an eight-stage series parallel heat selector switch, provides ample capacity for a wide range of metals. When equipped for spot welding, 2¾-inch diameter arms and 1¼-inch diameter ejector type holders are provided. Integrally cast cooling tubes are built into the platens.

Check No. 3 on Reply Card for more Details

Work Aligner Saves Time

Materials requiring rotation in manufacture, assembly, welding or repair may be handled with the rotary work aligner announced by Johnson Machine Works, 619 Menomonie St., Eau Claire, Wis. It insures perfect alignment of two or more pieces of work, eliminates expensive setups for miscellaneous jobs, is adapted to either centered or uncentered work and checks alignment or run out on any circular material from ¼ to 24-inches in diameter.

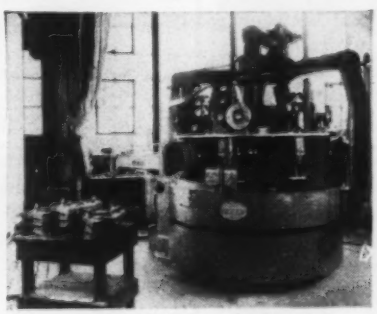
There are no limits to length of material which may be worked, as two or more units may be used in

handling long sections. At present four models are being produced in bed lengths from 5 feet 10 inches to 11 feet 6 inches with a load capacity of 1500 pounds. Welders can easily rotate the work to produce uniform welds on tubing, shafting or other material.

Check No. 4 on Reply Card for more Details

Close Tolerance Grinder

Large castings from 3 to 7 inches in thickness may be ground to close flatness tolerances on a production basis with the No. 372-72-inch Roto-Rotary grinder built by Charles H. Besly & Co., Beloit, Wis. Workholding fixtures are suspended from a rotary table located in a stationary drum mounted on three legs attached to the side of the machine. The rotary table revolves around a central



shaft. Four vertical shafts receive the workholding fixtures and are driven by sprockets geared to the central shaft.

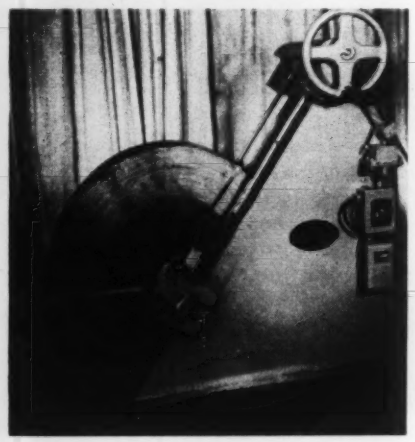
Fixtures are made of ½-inch mild steel plate. Each workholding station has openings for two castings. Pressure plates hold the work on the abrasive wheel, with grinding pres-

sure controlled by the operator to obtain the desired stock removal and flatness tolerance. Work stations are offset to allow oscillations of the castings to break both the inside and outside of the grinding wheel, dressing the abrasive disk as they grind.

Check No. 5 on Reply Card for more Details

Automatic Coil Cradle

Material up to 6 inches wide in coils of up to 40 inches OD and 1000 pounds in weight may be handled by the model ACCI-640 automatic coil cradle, made by U. S. Tool Co. Inc., Ampere, N. J. In loading the coil, a wooden core is first inserted in the inside of the coil and a support rod is inserted in the hole in the wooden core. Entire coil may be



rolled along the floor into position in the cradle where it is raised by means of a handwheel actuating elevating screws.

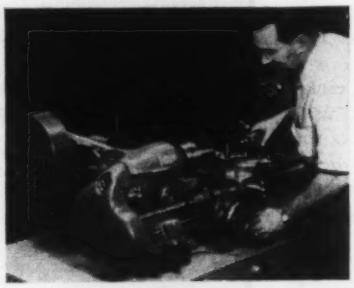
Cradle is equipped with hardened and ground feed rolls, mercury switch control and motor for operation on 220/440-v, 3-phase, 60-cycle, alternating current. The mercury switch control provides a loose loop of material between cradle and fabricating machine.

Check No. 6 on Reply Card for more Details

Lathe Has Four Bed Lengths

A line of tools, attachments and accessories, including taper attachment, handlever and handwheel collet attachments, collets, milling attachment, etc., are available for a 10-inch quick change gear lathe made by South Bend Lathe Works, South Bend 22, Ind. Offered in four bed lengths, it has beds of special gray iron with 30 per cent steel content added. Three V-ways and one flat way are hand-scraped to assure precision alignment of headstock, tailstock and carriage.

A wrenchless bull gear lock permits easy shifting of the back gears. Headstock spindle bearings are of the replaceable bronze sleeve type. A ball thrust bearing and take-up nut eliminates spindle end play. Spindle

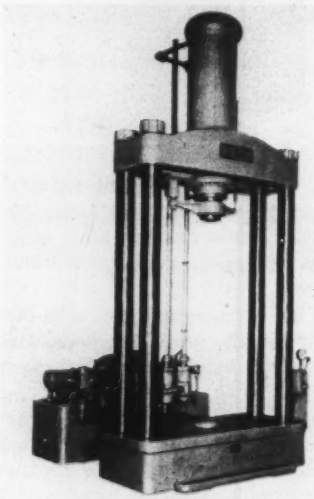


bore is $\frac{25}{32}$-inch and maximum collet capacity $\frac{5}{8}$-inch. Quick change gear box provides 48 thread cutting feeds, power longitudinal feeds or power cross-feeds. Two types of horizontal drive units are available: 12-speed, 48 to 1435 rpm drive with flat leather belt; a 16-speed, 52 to 1365 rpm drive with V-belt.

Check No. 7 on Reply Card for more Details

High Speed Forcing Press

A maximum of 275 inches per minute ram speed is a feature of the four-post hydraulic forcing press of 150-ton capacity, announced by Hannifin Corp., 1124 S. Kilbourn Ave., Chicago 24, Ill. Used primarily for



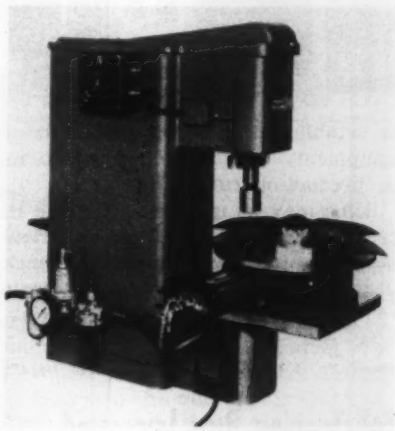
press-fit assembly, it has an 82-inch gap with ram up and a 48-inch maximum stroke. There are 60 inches between columns left to right and 10 inches front to back.

Press table is 36 inches from front to back, 18 inches above the floor and has a 10-inch hole in the center to allow shafts to extend through the table. A sensitive pressure control allows the operator to vary the amount of pressure applied by the amount he moves a single hand lever. When a uniform pressure is to be applied repetitively, a stop is provided to limit the travel of the control lever.

Check No. 8 on Reply Card for more Details

Automatic Cycling Press

Equipped with an eight-station air operated automatic dial index table is an oil hydraulic press built by Hy-Air Products Co., Jackson, Mich. Cycling is by energizing an automatic reset timer with a manually operated momentary contact switch on the timer. This starts the timer and the down stroke of the press ram. When the preset time has elapsed, the timer de-energizes the ram solenoid valve and the ram begins its return stroke. At the top of



the stroke a switch is tripped and the table advances to the next position.

Time for the cycle may be adjusted by a moving pointer on the timer dial for cycles of 1 to 60 seconds. A master switch allows the electrical circuit to be either hand or foot operated. Exhaust air automatically ejects parts. Mechanical ejection is also possible. Press is made in 2½ and 5-ton models with a stroke of 2 or 5 inches. Pressure, stroke and ram speed are adjustable. Four, 6, 12 and 24-position tables also are available.

Check No. 9 on Reply Card for more Details

Small Towing Tractor

Loads weighing up to 10 tons may be moved on trailers over a level course at speeds from 1 to 6.5 mph by the Clarkette 5 towing tractor, made by Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. Tractor need not be ridden to be operated; operation may be while walking on either side of it.

A combination clutch-and-throttle control bar extending across the

How do your employees WANT to invest their savings?

People are *more than twice as inclined* to invest their extra money in Savings Bonds as in any other form of savings or investment, according to the 1949 Survey of Consumer Finances*. That's adequate proof that your employees want your company to have the Payroll Savings Plan, by which they get the convenience of obtaining bonds regularly and "automatically"— delivered with their pay checks.

More than 20,000 companies operate Payroll Savings. The managements of these companies know it's "good relations" to provide this convenience. They can *see* the company-benefits in improved worker efficiency and stability. They know, too, that it's "good business"—because Payroll Savings boosts Bond sales, and Bond sales create a huge backlog of purchasing power that's "business insurance" for the years ahead.

Of course every Bond buyer builds financial independence because his Bonds at maturity will return $4 for every $3 he invests. Holding Bonds, moreover, helps him to realize he's making a profit on his job . . . makes him more resistant to influences which are unfavorable to our economic system.

It's *easy* to install Payroll Savings

Don't think that installing Payroll Savings is "a lot of work." All you need to do is appoint one of your top executives as Savings Bonds Officer and tell him to get in touch with your State Director, Savings Bonds Division, U. S. Treasury Department. The State Director will provide application cards, promotional material, and as much personal help as necessary. Remember—Payroll Savings *pays!*

**Sponsored by the Board of Governors of the Federal Reserve System and conducted by the University of Michigan. Based on 3,500 interviews in 66 sampling areas throughout the nation.*

The Treasury Department acknowledges with appreciation the publication of this message by

STEEL

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Seal and Insulate Furnace Brickwork
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When BTU consumption or volume of excess air is not satisfactory, check the improvements possible with THERM-O-FLAKE. This is the insulation designed especially for open hearth furnaces, and used regularly by most operators on exposed brickwork surfaces such as bulkheads, checker arches, end and side walls.

Open hearth furnaces sealed and insulated with THERM-O-FLAKE show increased operating efficiency due to higher air preheat and higher flame temperature. There is an important increase in thermal efficiency in regeneration. Radiation losses are safely minimized with a reduction in fuel costs.

Write for detailed information on how THERM-O-FLAKE can improve your furnace efficiency and reduce fuel costs.

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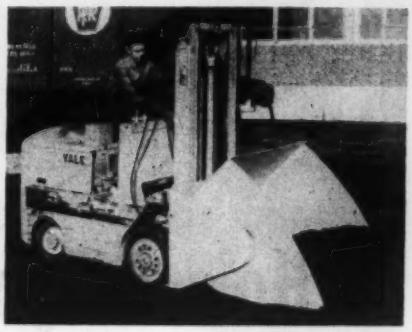
width of the tractor above the cowl makes possible ease of control and driving while the operator is walking. Braking is by touching a foot to the brake bar at the rear of the driving platform. Parking brake is actuated by electricity from a toggle switch on the instrument panel. Normal driving position places the operator only a few inches higher than the floor. A single steer wheel gives the machine a small turning radius.

Check No. 10 on Reply Card for more Details

Fork Truck Scoop Shovel

Manual handling of such bulk materials as sand, coal and gravel may be eliminated with the scoop shovel accessory for attachment to the Lift King and Worksaver electric and gas fork trucks, made by Yale & Towne Mfg. Co., Philadelphia, Pa. Scoop handles up to 27 cubic feet of



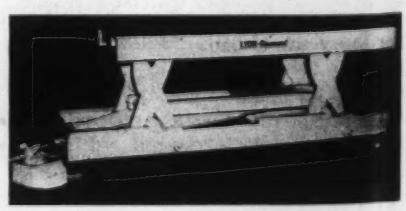
material. It tilts upward from the horizontal scooping position to cradle the load during transport, and tilts downward to completely discharge the load when dumping.

Device scoops at the ground level or digs into piled material. Unloading may be into bins, vats, hoppers, mixers or other receptacles at heights up to 130 inches. Scoop is designed to carry a full capacity load without loss in transfer.

Check No. 11 on Reply Card for more Details

Wide Range Elevating Table

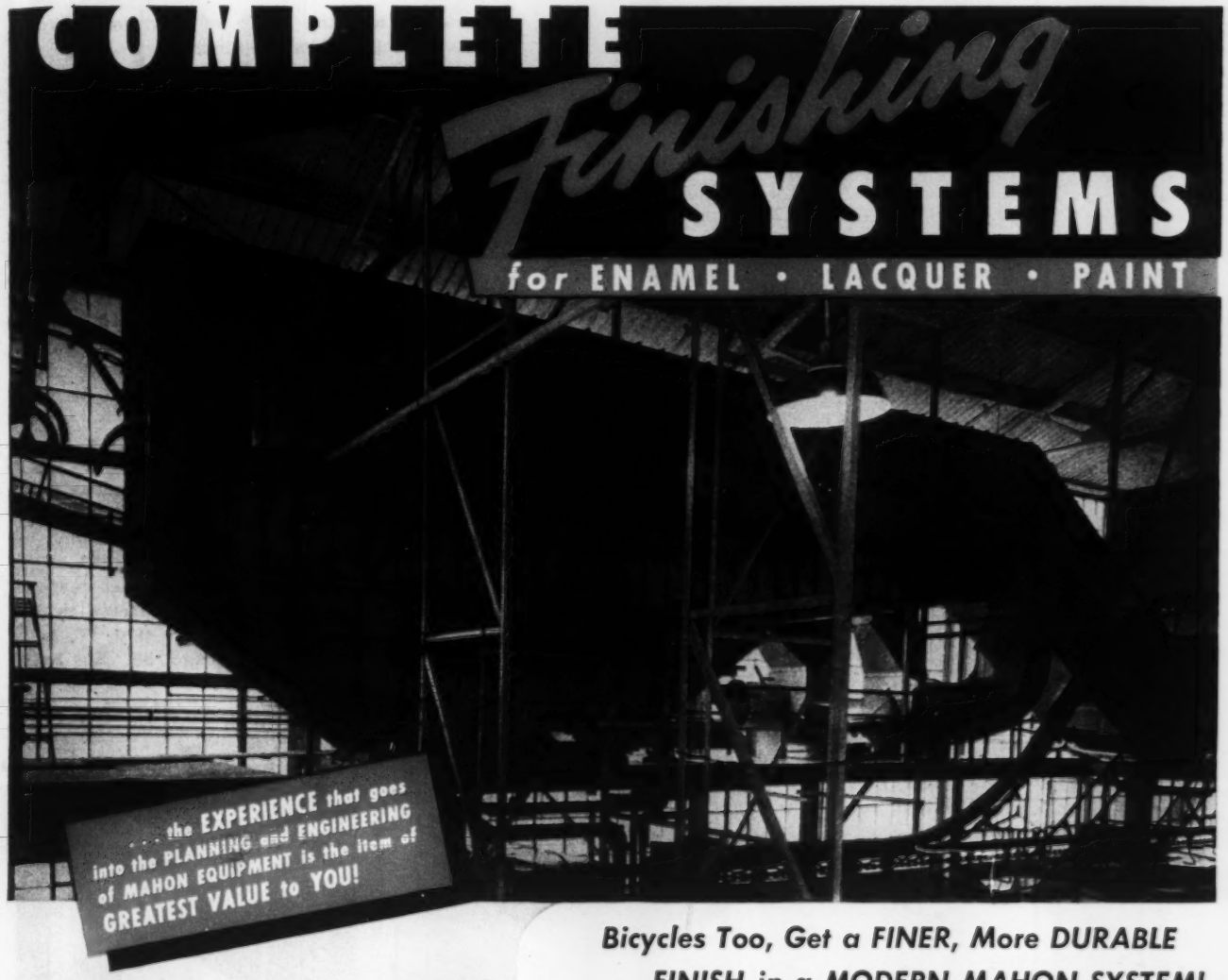
Lower height and a greater range of elevation is made possible with the compound lever arrangement on the hydraulic sheet feeding table



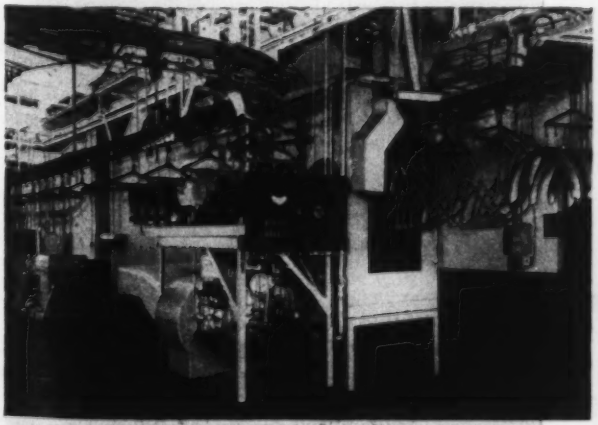
made by Lyon-Raymond Corp., 9167 Madison St., Greene, N. Y. Model 1196 has a capacity of 10,000 pounds

COMPLETE *Finishing* SYSTEMS

for ENAMEL • LACQUER • PAINT



Mahon Flow Coating Machine with enclosed drip zone and tunnel to the Finish Baking Oven which is visible at the extreme right. Both Flow Coating Machine and Baking Oven are located overhead to permit maximum use of available manufacturing floor space.



Bicycle parts emerging from the Mahon Dry-Off Oven. The Mahon Five Stage Metal Cleaning and Rust Proofing Machine is at the left. All Heating Units throughout the system are equipped for either Gas or Oil Firing—change over from Gas Firing to Oil Firing may be accomplished in a matter of seconds without interrupting production.

Bicycles Too, Get a FINER, More DURABLE FINISH in a MODERN MAHON SYSTEM!

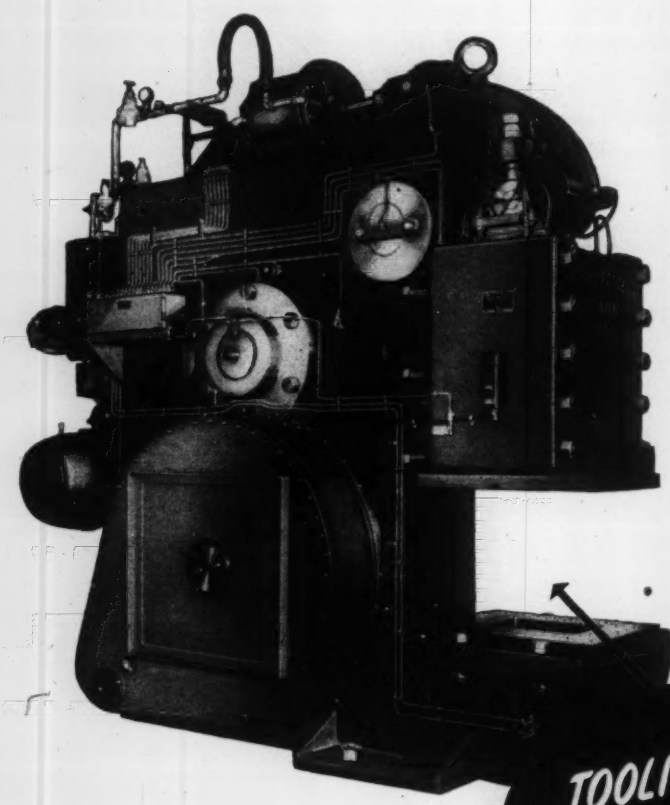
The Complete Finishing System illustrated here was planned, engineered, built and installed by Mahon for the Cleveland Welding Company, manufacturers of the famous Roadmaster Bicycle. The system was designed to produce the finest finish obtainable at lowest possible unit cost, and to occupy a minimum of floor space within the plant . . . it provides continuous conveyorized processing from metal cleaning and rust proofing through dry-off, flow coating, and finish baking operations. The flow coating machine and baking oven are located overhead to conserve manufacturing floor space. This is another typical example of good planning and good engineering in modern production equipment designed to reduce costs and improve product finish. If you have a finishing problem, or are contemplating new finishing equipment, remember that the Mahon organization has pioneered development in this highly specialized field for thirty years . . . broad experience in every industry where finishing constitutes a major production operation, plus constant research and experimentation, has endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Mechanical Industries File for complete information, or write for Industrial Equipment Catalog A-649.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 11, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Dry-off Ovens, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens. Also, Core Ovens, Dust Collectors, and many other Units of Production Equipment.

MAHON



250 TO 1200-TON CAPACITIES!

TOOLING SPACE OPEN ON 3 SIDES!

IN "Buffalo" MILL TYPE SHEARS

- FASTER PUNCHING, SHEARING, BLANKING!
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158 MORTIMER ST. — BUFFALO, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Write for Bulletin 3650

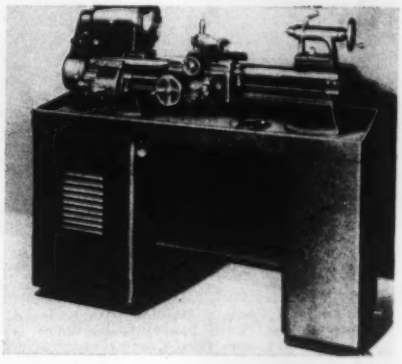
and the range of elevation is from 12 inches to 36 inches.

Platform measures 36 x 96 inches; end and side extensions are available to increase area. There are no uprights extending above the platform to stand in the way of overhanging material. For faster elevation than that provided by the two-speed foot pump, a power-operated pump with either pushbutton or foot switch control is available. Table is offered with wheels and casters to make a portable unit with a lowered height of 20 inches.

Check No. 12 on Reply Card for more Details

Conveniently Controlled Lathe

Bed ways precision ground to within 0.0005-inch of absolute lineal accuracy and less than 0.0005-inch total run-out of the spindle 12 inches from the front bearing are features of the No. 955 lathe, offered by Logan Engineering Co., 4901 W. Lawrence Ave., Chicago 30, Ill. Lathe



has a 1-inch collet capacity, 11-inch swing, 1⅜-inch spindle hole and center distances of 24 or 36 inches.

Mounting is on a pedestal base with underneath drive completely enclosed. Base is recessed at floor level for operator toe room. All control parts are conveniently placed at the operator's finger tips.

Check No. 13 on Reply Card for more Details

• • •

ADDITION FOR RINSE TANKS: Rins-Aid for addition in very small amounts to a static rinse tank, is announced by R. O. Hull & Co. Inc., Cleveland 13, O. It forms a water-repellent film on freshly plated work, thus leaving the work virtually dry.

Check No. 14 on Reply Card for more Details

TEST SPRINGS: Two newly redesigned machines for testing the loads and deflections of compression and extension springs are announced by Carlson Co., New York 7, N. Y. Both can be used for general purpose test-

HIGH TORQUES?

DE LAVAL SPEED REDUCERS

For low final speeds Worm Gear Speed Reducers should be selected on the basis of output torque ratings.

If your problem is to select a gear reducer capable of carrying high torques, consult De Laval, either directly or through a sales representative.

ONE OF 93

This double reduction De Laval Worm Gear Speed Reducer is available with many standard gear ratios and is but one of 93 sizes and types of standard De Laval Worm Gear Speed Reducers.

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Worm Gear Division

DE LAVAL

De Laval Steam Turbine Co., Trenton 2, N. J.

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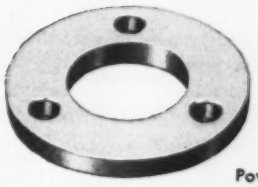
CENTRIFUGAL BLOWERS AND COMPRESSORS • IMO OIL PUMPS

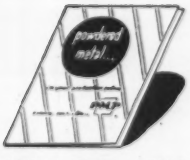


Powdermet production saved 400% on this pump housing!

POWDERMET* PARTS

Cost Less!

"Matched pairs" like these... actual production parts, one produced by conventional methods and one Powdermet, identical in precision and performance...prove the amazing economies made possible through Powdermet fabrication. And when special properties like electrical permeability or controlled porosity are important, Powdermet parts offer functional advantages too! Exclusive Powdermet production techniques have extended the application of powder metallurgy to whole new production fields—helical gears, stress members, filters—write today for the free booklet shown here and see how you can save with Powdermet parts!



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PMP

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of America

9335 West Belmont Avenue
Franklin Park, Illinois

*Trademark

ing and for large quantity production testing. Speed of operation, depending on type of test, is up to 800 spring tests per hour. Capacity of type R80 is ½-ounce to 175 pounds and that of type RS-5 is from 1/64-ounce to 12½ pounds. Both testers can accommodate springs 12 inches long under test.

Check No. 15 on Reply Card for more Details

FOR LIGHTING INSTALLATIONS: Four new all-aluminum unit packages which have been developed for all types of outdoor lighting installations are available from Thompson Electric Co., Cleveland 14, O. Packages include a complete disconnecting and lowering hanger, a lighting fixture adapter and necessary equipment.

Check No. 16 on Reply Card for more Details

PROTECTS WELDING PLATES: To protect costly welding plates from damage, a new clear plastic cover plate is introduced by American Optical Co., Southbridge, Mass. Two sizes are available: Standard 2 x 4¼ inches and 2 x 4⅛ inches which is provided on special order.

Check No. 17 on Reply Card for more Details

SOLENOID OPERATED VALVE: Nopak model SL, ring type, solenoid operated valve, announced by Galland-Henning Mfg. Co., Milwaukee 15, Wis., embodies a solenoid-actuated pilot. Valve is energized by a continuous duty standard solenoid unit which is unaffected by oil. Sealing mechanism consists of a valve ring and O-ring of Neoprene.

Check No. 18 on Reply Card for more Details

MEASURES MAGNETIC SUSCEPTIBILITIES: GM-1 Gouy magnet, made by Dings Magnetic Separator Co., Milwaukee 14, Wis., may be used to detect ferromagnetic impurities and determination of carbon content in steels. It consists of a U-shaped soft iron yoke, two cylindrical pole pieces, two coils mounted on pole pieces and two removable pole faces.

Check No. 19 on Reply Card for more Details

RETRACTABLE LANDING GEAR: United Mfg. Co., Bedford, O., offers a new retractable landing gear assembly that can be easily attached to all types of two-wheel single axle trailers. Recommended for use with heavy industrial portable equipment, it provides for easy manual moving or positioning of fully-loaded units.

Check No. 20 on Reply Card for more Details

T-SLOT BOLTS: Developed by T. M. Crayton, Philadelphia 42, Pa., the new patented T-slot bolts are forged from Timken (SAE 4140) steel, machined to precise dimensions, hardened and long drawn in an isothermic quench. They are available in ⅜, ½, ⅝, ¾, ⅞, 1, 1¼ and 1½-inch diameters and in various lengths from 1 to 30 inches.

Check No. 21 on Reply Card for more Details

PREFORMED TOOL BIT: Available from Dow Mechanical Corp., Thompsonville, Conn., is a lathe tool bit preformed of high speed steel with a Rockwell minimum of C 66. Lead and point clearance are already formed into the blank for both right and left hand. Lead clearance is fixed and positive throughout the entire length of the bit.

Check No. 22 on Reply Card for more Details

FOUR IN ONE: Designed as LK, a new push broach that will cut from one to four precision keyways in a single pass is introduced by Kase Machine Co., Cleveland 19, O. Designed for use with hydraulic, air, or hand-operated presses, it can be furnished on order in diameters from ¾ to 2½ inches, in 1/32-inch increments. Blade widths range from 3/16 to ⅝-inch, depending upon broach diameter.

Check No. 23 on Reply Card for more Details

HYDRAULIC RELIEF VALVE: Available for pressure settings ranging from 100 to 5000 psi, the new valve announced by Hydraulics Division, Pantex Mfg. Corp., Pawtucket, R. I., opens and closes within a 7 per cent differential. The entire operating mechanism is contained in a cartridge which is designed so that it may be easily replaced without breaking the line. Pressure adjustments are made by an accessible adjustment screw.

Check No. 24 on Reply Card for more Details

ELIMINATES TUBE GOUGING: Aircraft Fitting Co., Cleveland 14, O., introduces a new flareless tube fitting of improved design that eliminates tube gouging and limits tube distortion. Gripping action of the fitting sleeve forms a positive leakproof seal. Fitting is available in all standard shapes and sizes for tubing up to and including 1 inch OD.

Check No. 25 on Reply Card for more Details

RUBBER SEATED VALVES: For positive shutoff, rubber seated valves that are drip tight with water at 100 psig and air bubble tight at 80 psig under temperature up to plus 275° F and as low as minus 40° F, are offered by R-S Products Corp., Philadelphia 44, Pa. Under pressure rubber yields both radially and longitudinally around shaft bosses and periphery of the valve to insure positive shutoff.

Check No. 26 on Reply Card for more Details

MINIATURE SPEED CHANGERS: Ideal for controllers, registers, computers and servomechanisms, miniature speed changers with zero backlash are offered by Metron Instrument Co., Denver 9, Colo. Units are available in more than 500 different ratios. Gears are precision hobbed, 96 pitch and hardened to provide smooth running.

Check No. 27 on Reply Card for more Details

PAINT SPRAYING MASKS: Electro-formed paint spraying masks for precision spraying of paints and lacquers on complex objects are offered by Vertrod Corp., Brooklyn 7, N. Y. By an electrolytic process, a strong copper shell is produced which accurately fits over the object to be processed. Designated areas are cut out of the shell to allow paint or lacquer to pass through.

Check No. 28 on Reply Card for more Details

TOOL HOLDERS: Hard chrome plating of the heads is featured in the new line of standard ejector tool holders for solid carbide inserts offered by Super Tool Co., Detroit 13, Mich. Other features include a lock-screw on top of holder where it is easily accessible for fast insert interchange without removing holder from tool post and a knock-out hole for easy removal of the insert.

Check No. 29 on Reply Card for more Details

POWER TOOLS: Precision machine ground, tungsten carbide rotary files and ground-from-the-solid carbide end mills and reamers are announced by Charles L. Jarvis Co., Middletown, Conn. Rotary files are produced to exact, predetermined shapes. Mills are available with up to ½-inch shank diameter. Reamers are precision ground with an odd number of flutes to oppose a crushing load on the cutting edges and ream to close tolerances. Radius is ground at the front end to eliminate breakdown of the corner.

Check No. 30 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

75. Carbide Tipped Tools

Corundum Co.—4-page bulletin describes Corundum tungsten carbide and cast alloy tipped tools and new price schedule on standard tools tipped with Carboloy, Vascoloy, Firthaloy, Carmet and other carbides. Tools covered are cutters, dies, boring and form tools, milling cutters, reamers and diamond tools.

76. Disk-Type Wheel

Geneva Wheel Co.—2-page illustrated bulletin 1013 covers model D-140 four-ply 400 x 18 pneumatic-tired disk wheel for portable industrial equipment. Wheel is of drop center rim, double disk construction with seamless steel tubing hub. Tire affords good cushioning and floatation.

77. Cone Roof Storage Tanks

Graver Tank & Mfg. Co., Fabricated Plate Div.—12-page illustrated technical report "Evaporation Losses from Cone Roof Tanks" sets forth practical method of estimating evaporation and filling losses in cone roof tanks. Emphasis is given to importance of vapor space expansion and vapor pressure.

78. Gray Iron Specifications

Gray Iron Founders' Society—4-page bulletin contains resume of provisions of fourteen separate sets of gray iron specifications including change of designation in ASTM A-159-47 to ASTM A-159-49T and addition of two new specifications covering new automotive irons 113 and 114.

79. Steel Tubing

Bundy Tubing Co.—20-page illustrated manual "Bundyweld Steel Tubing" contains technical data and fabricating information on this copper coated brazed steel tubing. Typical fittings are illustrated; and brief descriptions are included on bending, forming, machining and joining methods of manufacture.

80. Rubber Conveyor Belting

Carlyle Rubber Co.—12-page pamphlet "Installation, Care & Maintenance of Rubber Conveyor Belting" discusses receiving and storage of belting, splicing, training and making repairs by cold patch and heat vulcanized methods.

81. Cast Iron Welding

Eutectic Welding Alloys Corp.—6-page illustrated leaflet on Eutectrode 24 tells how this electrode can be employed in cold arc welding operations on small or large iron castings. Flat beads form smooth deposit and glossy surface without undercut, cross checks, cracking or distortion.

82. Nodular Cast Irons

Cerium Metals Corp. — 8-page booklet entitled "The Production of Nodular Cast Irons with Cerium—Some Practical Details" gives details of actual practice in adding cerium to foundry melt, as developed by British Cast Iron Research Association for its membership.

83. Automatic Screw Slotters

Waterbury Farrel Foundry & Machine Co.—8-page illustrated booklet No. 925-A explains construction features of screw slotting machines which are built in four standard sizes ranging in capacity from No. 5 to 30 machine screws having maximum shank lengths from 1 to 4 in. Production rate is infinitely variable and is regulated by small handwheel having graduated scale.

84. Presses

E. W. Bliss Co.—20-page illustrated publication "The Dominant Factor in Pressed-Metal Production" presents case examples of use of mechanical and hydraulic presses in production lines of automotive, aircraft, railroad, electrical, household appliance, business machine and other industries.

85. Metalworking & Stamping

Charles T. Brandt Inc.—8-page illustrated folder file "Complete Production Facilities" depicts and describes company's facilities as well as automotive stampings, heavy weldments and pressed steel shapes produced. Custom-built automotive body stampings are reviewed in 4-page insert.

86. Electrostatic Precipitation

General Electric Co.—16-page illustrated bulletin No. GEA-5212 explains operation of electrostatic precipitation process, gives case histories of seven typical installations using system, and describes various methods and electric equipment applicable to each.

87. Heat Exchanger Tubes

Babcock & Wilcox Tube Co.—Illustrated bulletin TB-329 concerns economical choice of appropriate tubing for specific service conditions in heat transfer units and for easy fabrication in heat exchanger apparatus. Such problems as resistance to corrosion and oxidation, strength at high and low temperatures and fabrication requirements are discussed.

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88. Electrical Contacts

Fansteel Metallurgical Corp.—36-page illustrated form M-105 contains information of value to design engineers on electrical contacts. Subjects covered include contact design, materials, properties and principal uses. Assembly methods such as riveting, spinning, upsetting, brazing and spot and projection welding are discussed also.

89. Rubber Lined Equipment

B. F. Goodrich Co.—8-page illustrated catalog section 9780 gives design, construction and service recommendations as well as uses of rubber lined products. These include pipe, gaskets for flanged pipe assembly, expansion joints, Flexseal connectors, Vulcalock valves and relinable valves.

90. Radiographing Materials

Eastman Kodak Co.—16-page illustrated catalog Fl-3 describes films for use with x-ray equipment of varying kilovoltage and with specimens of varying thickness and density. Information on relative speeds and contrast of different film emulsions is provided in handy chart to enable radiographer to select quickly material suited to his needs.

91. Gray Iron Castings

Eaton Mfg. Co.—16-page illustrated brochure "Eaton Permanent Mold Gray Iron Castings" shows wide variety of uses of gray iron castings which are volume-produced in mechanically operated metal molds without application of pressure. Process produces castings with fine-grained homogeneous structure that insures freedom from porosity.

92. Air Cylinders

Rivett Lathe & Grinder, Inc.—16-page illustrated catalog section No. 54 is devoted to helping engineer lay out air circuits. Drawings and tables are furnished for each model and size Gerotor air cylinder showing complete dimensions. Cylinder mountings described include rabbet, foot, trunnion, center line, blind end flange, rod end flange and clevis.

93. Storage Batteries

Gould Storage Battery Corp.—40-page illustrated revised pocket-size handbook presents technical instructions and engineering data on care of motive-power storage batteries. Sections cover theory of lead-acid battery, care and operation, maintenance and repairs, parts and technical data presented in chart form.

94. Belt Conveyor Systems

Transall Inc.—4-page illustrated circular "Belt Conveyor Systems" reviews variety of bulk materials hauling systems and components. Features are heavy-duty construction ball bearings and sealed-in lubrication. Flat belt and troughing idlers are covered also.

95. Dust Collectors

American Wheelabrator & Equipment Corp.—4-page illustrated bulletin No. 262 depicts methods of using Dustube dust collectors to improve working conditions and quality control, lower maintenance costs and provide more efficient production on such operations as grinding, blast cleaning and saw glazing.

96. Scrap Metal Baler

Dempster Brothers, Inc.—6-page illustrated folder form No. 600-A explains features of type D model 600 S-1 Dempster Balester high speed press that turns out scrap metal bales at rate of 6 to 7½ tons per hour. Sturdy construction of this unit permits top-speed production over long sustained periods.

97. Automatic Centering Reels

F. J. Littell Machine Co.—4-page illustrated circular describes standard automatic centering reels for holding coils of material from 300 to 6000 lb. They are obtainable as manual or motor driven units and enable machine operator to change to different coil easily and quickly.

98. Chemical Feeders

Black, Sivalls & Bryson, Inc.—12-page illustrated part 2 section 8 of catalog No. 54 explains how self-contained chemical feeder meets requirements of industrial processes which call for small and precise quantities of chemicals. Automatic unit has wide pressure range and operates from either compressed air or gas.

99. Metal Cleaning

Diversey Corp.—Three illustrated publications concern characteristics, applications and production records of metal cleaning products and processes. Bulletin 49-B describes reverse current electrocleaner for steel, copper and copper alloys. Folder 49-D presents process for preparing aluminum and its alloys for spot welding. Third manual discusses alkaline nonetching aluminum cleaner.

100. Bending Presses

Cleveland Crane & Engineering Co.—8-page illustrated catalog form 2010-E provides construction details, dimensions and specifications for line of Steelweld bending presses. Shown are various components of machines and design features. Units are used for bending, braking, punching, blanking, drawing and corrugating.

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Market Summary

HIGH-LEVEL steelmaking operations are assured for second quarter. Producers will enter the period with large order backlogs, especially in light, flat-rolled products. Overflow tonnage from first quarter will be substantial. Shipment delays will continue to be experienced. Increasing number of sheet sellers, oversold for the period, are temporarily withdrawing from the market. Despite the strong current market position, uncertainty for business after midyear persists. But trade authorities expect no letdown until well into summer.

CAUTION— Industrial purchasers, while pressing for deliveries of currently tight-supply products, are placing new orders cautiously. They are apprehensive of being caught with large inventories. Labor developments in the auto industry are being watched closely, cutbacks in steel needs being anticipated in event General Motors plants are stuck. To what extent consumers' anticipated forward requirements earlier in the year is uncertain. January mill shipments of finished steel, however, totaled 5,482,691 net tons, largest since April last year.

OPERATIONS— Steel production has recovered fully from the coal strike. Last week the national ingot rate went up another 6 points, hitting 96 per cent of capacity. This rate, equivalent to output of 1,830,016 tons weekly, is the fastest pace attained since week ended May 7 last year. Since the coal strike's end ingot operations have risen from a low of 69 per cent, up 27 points in less than three weeks.

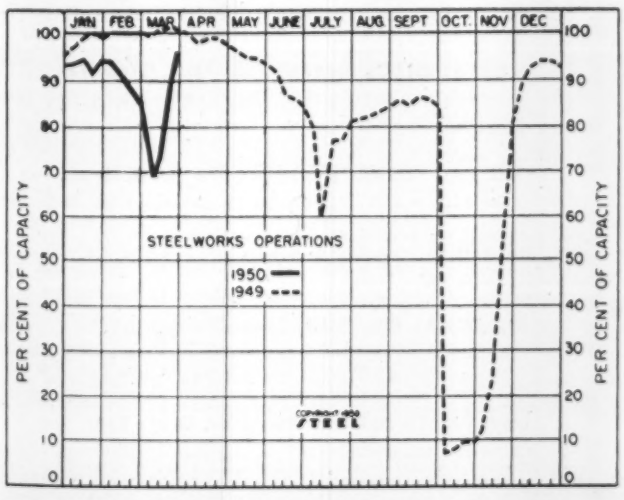
SUPPLY— Light, flat-rolled steel producers hold large tonnage arrearages. Much of this is due to heavy consuming pressure over past months. But disruption of steelmaking operations during the coal crisis also is a factor having set back shipping schedules as much as a month. Substantial arrearages also exist in pipe, but this product has been under better control than sheets and strip. There also will be carryover in wire products, and in bars. In general, however, bars, along with plates and shapes, are in fairly current supply position. In so-called capacity-minus areas, such as Chicago, supply conditions are much tighter than elsewhere. Banning of basing point pricing is an important factor in this situation.

DEMAND— Here and there consumer requirements are expanding seasonally. Bridgework and other construction needs are stimulating activity in structurals. Producers of small forgings are busier, resulting in stronger demand for bars and billets. Modest increase in plate requirements is reported but tonnage is available for early shipment. Heaviest demand is for light, flat-rolled items, even specialties in this line being under pressure.

IMPORTS— Belgian and German steel is flowing into this country in larger quantities. As yet, competition is not too severe, but fear is rising that the movement, if continued, will adversely affect the domestic market in some areas. Tonnage is coming chiefly from Belgium not only along the eastern seaboard but at southern and western ports as well. Tonnage offers are floating around the Midwest for delivery by vessel at Great Lakes ports. Some very attractive prices are being offered, up to $20 per ton under domestic delivered levels, on wire rods, deformed bars, angles, rounds, flats, plates and some strip.

PRICES— Except for minor changes, chiefly in extras, prices are unchanged. Phoenix Iron & Steel Co. will revise size extras on structurals Apr. 1. Other market changes of note include advances on Wise County and New River beehive coke.

COMPOSITES— STEEL's weighted index of finished steel prices is unchanged at 156.13, as is the arithmetical finished steel price composite at $93.18. Pig iron composites also are holding with No. 2 foundry, $46.47, basic, $45.97, and malleable, $47.27. The steelmaking scrap composite is up 66 cents to $28.66.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Mar. 25	Change	Same Week 1949	Same Week 1948
Pittsburgh	96	+ 3*	100	95
Chicago	98.5	+ 9.5*	101	95
Eastern Pa.	87	+ 4	95.5	84
Youngstown	100	+20	101	98
Wheeling	101	+ 1	96.5	92.5
Cleveland	98	+ 2*	106	94.5
Buffalo	104	0	104	85
Birmingham	100	+13	100	97.5
New England	82	+ 2	89	77
Cincinnati	103	+ 7	103	96
St. Louis	88.9	+ 4.4	82.5	77.5
Detroit	104	0	111	104
Western	87	+ 1	97	..
Estimated national rate	96	+ 6	101	93

Based on weekly steelmaking capacity of 1,906,267 net tons for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948.
*Change from revised rate.

News Summary—p. 35 Production-Engineering News—p. 65

Composite Market Averages

	Mar. 23 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.13	154.85	100.65
Index in cents per lb....	4.230	4.230	4.230	4.195	2.727
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$93.18	$93.18	$93.18	$97.23	$57.55
No. 2 Fdry Pig Iron, GT	46.47	46.47	46.47	46.63	24.67
Basic Pig Iron, GT....	45.97	45.97	45.97	46.22	24.00
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.34	25.29
Steelmaking Scrap, GT..	28.66	28.00	27.67	33.66	19.17

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No.1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 23 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.45	3.45	3.45	3.45	2.15
Bars, H.R., Chicago.....	3.45	3.45	3.45	3.35	2.15
Bars, C.F., Pittsburgh	4.10–15	4.10–15	4.10–15	3.95-4.00	2.65
Shapes, Std., Pittsburgh..	3.40	3.40	3.40	3.25–30	2.10
Shapes, Std., Chicago.....	3.40	3.40	3.40	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.50	3.50	2.20
Plates, Chicago	3.50	3.50	3.50	3.40	2.20
Plates, Coatesville, Pa. ...	3.60	3.60	3.60	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.50	3.45	2.20
Plates, Claymont, Del. ...	3.60	3.60	3.60	3.95	2.20
Sheets, H.R., Pittsburgh..	3.35	3.35	3.35	3.25–30	2.20
Sheets, H.R., Chicago	3.35	3.35	3.35	3.25	2.20
Sheets, C.R., Pittsburgh...	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Chicago.....	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh....	3.25	3.25	3.25	3.25–70	2.10
Strip, H. R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh....	4.15	4.15	4.15	4.00–75	2.80
Strip, C.R., Chicago	4.30	4.30	4.30	4.00–25	2.90
Strip, C.R., Detroit	4.35–40	4.35–40	4.35–40	4.20–50	2.90
Wire, Basic, Pittsburgh...	4.50	4.50	4.50	4.15	2.60
Nails, Wire, Pittsburgh...	5.30	5.30	5.30	5.15–6.30	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.50	$7.75	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$63.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	57.00–58.00	57.00–58.00	67.00	34.00
Wire rods, 7/32-⅜", Pitts...	3.85	3.85	3.85	3.775	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$25.50
Basic, Valley	46.00	46.00	46.00	46.00	24.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	26.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, Chicago....	46.50	46.50	46.50	46.00–50	25.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.80	26.46
No. 2 Fdry, Birm.	42.38	42.38	42.38	43.38	21.38
No. 2 Fdry.(Birm.)Del Cin.	49.08	49.08	49.08	49.43	25.06
Malleable, Valley	46.50	46.50	46.50	46.50	25.00
Malleable, Chicago	46.50	46.50	46.50	46.50	25.00
Charcoal, Lyles, Tenn. ...	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts...	$32.00	$32.00	$32.00	$36.00	$21.00
No. 1 Heavy Melt. E. Pa..	25.00	24.00	23.50	31.50	18.75
No. 1 Heavy Melt. Chicago	29.00	28.00	27.50	33.50	18.75
No. 1 Heavy Melt. Valley..	31.75	31.75	31.75	37.25	20.00
No. 1 Heavy Melt. Cleve. .	28.25	28.25	28.25	35.25	19.50
No. 1 Heavy Melt. Buffalo	28.25	28.25	28.25	35.25	19.25
Rails, Rerolling, Chicago..	45.50	45.50	40.50	42.50	20.25
No. 1 Cast, Chicago.....	41.00	41.00	41.00	37.00	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl...	$14.25	$14.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl...	16.00	16.00	15.50	17.00	7.75
Oven Fdry., Chicago.....	21.00	21.00	21.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis.....	10.00	10.00	9.75	16.00	8.25
Lead, St. Louis	10.30	10.30	11.80	17.825	6.35
Tin, New York	77.75	77.00	74.25	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	24.50	24.50	27.25	38.50	15.00
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	41.88	42.38	....	....
Woodward,Ala W15	41.88	42.38	....	....
Cincinnati,del	....	49.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y., W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y., T9	....	46.50	47.00	....
Boston,del	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14 Y1	46.00	46.50	46.50	....
So.Chicago,Ill C3	46.00	....	46.50	47.00
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del (incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts,N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRock,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y., R2	48.00	48.50	49.00	49.50
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si to 11.50%)

Jackson,O. G2, J1	$57.00
Buffalo H1	58.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt. allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

LylesTenn. T3	$60.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Mar. 23, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)
Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
SoDuquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. C3 .... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 .58.00
Ensley,Ala. T2 ..... 53.00
Fairfield,Ala. T2 ..... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 .... 53.00
Lackawanna,N.Y. B2 .. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
SoChicago,Ill. C3 .... 53.00
So.Duquesne,Pa. C3 .. 53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 .... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken,Pa. A3.. 65.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 ..... 63.00
Fontana,Calif. K1 .... 85.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 71.00
Ind.Harbor,Ind. I-2 ... 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
LosAngeles B3 ..... 82.00
Munhall,Pa. C3 ..... 63.00
Seattle B3 ..... 82.00
So.Chicago C3,R2,W14.63.00
So.Duquesne,Pa. C3 ... 63.00
So.SanFrancisco B3 ... 82.00
Warren,O. C17 ..... 63.00

Alloy (NT)
Bethlehem,Pa. B2 .... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2, T7 .... 66.00
Conshohocken,Pa. A3.. 68.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 .... 85.00
Gary,Ind. C3 ..... 66.00
Houston,Tex. S5 ..... 74.00
Ind.Harbor,Ind. Y1 ... 66.00
Johnstown,Pa. B2 .... 66.00
Lackawanna,N.Y. B2 .. 66.00
LosAngeles B3 ..... 86.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 66.00
Sharon,Pa. S3 ..... 66.00
So.Chicago C3,R2,W14.66.00
So.Duquesne,Pa. C3 .. 66.00
Warren,O. C17 ..... 66.00
Youngstown Y1 ..... 66.00

SHEET BARS (NT)
Mansfield,O. E6 ..... $58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 ... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP
Aliquippa,Pa. J5 ..... 3.25
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 ... 3.15

WIRE RODS
AlabamaCity,Ala. R2 .. 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala. T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 .... 3.85
Johnstown,Pa. B2 ..... 3.85
Joliet,Ill. A7 ..... 3.85
LosAngeles B3 ..... 4.65
Minnequa,Colo. C10 ... 4.10
Monessen,Pa. P7 ..... 3.85
No.Tonawanda,N.Y. B11.4.10
Pittsburg,Calif. C11 ... 4.50
Portsmouth,O. P12 .... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 .... 3.85
SparrowsPoint B2 ..... 3.95
Sterling,Ill.(1) N15 .... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65

STRUCTURALS
Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 ..... 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.00
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 ... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif.(22) P1 .... 4.02
Phoenixville,Pa. P4 .... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14.3.40
So.SanFrancisco B3 ... 3.95
Torrance,Calif. C11 .... 4.00
Weirton,W.Va. W6 .... 3.40

Alloy Stand. Shapes
Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 ..... 5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2.. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1.5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 ..... 5.15
So.Chicago,Ill. C3 ..... 5.15
Struthers,O. Y1 ..... 5.15

Wide Flange
Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 ..... 3.40

H-S., L-A. Wide Flange
Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill. C3 ..... 5.10

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ... 4.20
Lackawanna,N.Y. B2 .. 4.20
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 .... 4.20
Weirton,W.Va. W6 .... 4.20

PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky.(15) A10 .. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 ..... 3.60
Conshohocken,Pa. A3 .. 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 ..... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa. B2 ..... 3.50
Lackawanna,N.Y. B2 .. 3.50
Minnequa, Colo. C10 ... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14.3.50
SparrowsPoint,Md. B2..3.50
Steubenville,O. W10 .... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 .... 3.50
Youngstown C3, R2, Y1.3.50

PLATES (Universal Mill)
Fontana,Calif. K1 .... 4.40

PLATES, Carbon, A.R.
Fontana,Calif. K1 ..... 5.25

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 .... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago,Ill. C3 ..... 4.40
SparrowsPoint,Md. B2..4.40

PLATES, Wrought Iron
Economy,Pa. B14 ..... 7.85

PLATES, High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 ..... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.60
Ind.Harbor,Ind. I-2, Y1.5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So.Chicago,Ill. C3 ..... 5.35
SparrowsPoint,Md. B2 .. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35

PLATES, Ingot Iron
Asland,c.l.(15) A10 .... 3.75
Ashland,lcl(15) A10 ... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 .. 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill.(1) L1 ..... 3.45
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 ... 4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. G3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1.3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 3.85
Niles,Calif. P1 ..... 4.17
N.Tonawanda,N.Y.B11 .3.45
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
Seattle B3, N14 ..... 4.20
SoChicago C3, R2, W14.3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2 .... 3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Johnstown,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 .. 3.45
Niles,Calif. P1 ..... 4.17
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SanFrancisco S7 ..... 4.00
Weirton,W.Va. W6 .... 3.45

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 ..... 3.65

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2, T7 ..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 .... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1.3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 .... 4.55
Lackawanna,N.Y. B2 .. 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14.3.95
So.Duquesne,Pa. C3 ... 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BARS, Hot-Rolled Ingot Iron
Ashland,Ky.(17) A10 .. 3.70

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 .... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1-5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 .. 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 ... 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 ..... 4.15
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12,R2.4.15
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20 .... 4.15
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.35
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 .. 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13.4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8 ... 4.15
Midland,Pa. C18 ..... 4.15
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 .... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .. 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3, Y1 .... 4.15

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
BeaverFalls,Pa. M12 .. 4.90
Bethlehem,Pa. B2 ..... 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7 ..... 4.90
Carnegie,Pa. C12 ..... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20 .... 4.90
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.90
Elyria,O. W8 ..... 4.90
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2, M13.4.90
Hartford,Conn. R2 .... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .. 4.90
Mansfield,Mass. B5 .... 5.20
Massillon,O. R2, R8 ... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.90
Newark,N.J. W18 ..... 5.20
Plymouth,Mich. P5 .... 5.10
So.Chicago,Ill. R2, W14.4.90
Struthers,O. Y1 ..... 4.90
Waukegan,Ill. A7 ..... 4.90
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 5.20
Youngstown F3, Y1.... 4.90

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Huntngtn,W.Va.(3) W7.. 3.45
Moline,Ill.(3) R2 ..... 3.40
SouthAvis,Pa.(2) J8 ... 3.30
SouthAvis,Pa.(41) J8 .. 3.30
SouthAvis,Pa.(42) J8 .. 3.30
Williamsport(2,3) S19 .. 3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Staybolt) B14.11.30
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng. Bolt) U1 .. 13.50
Dover(Wrgh. Iron) U1 .12.25
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5 ..11.25
McK.Rks.(Staybolt) L5.12.75

BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ..4.50
Johnstown, ¼-1" B2 ..4.35
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Seattle B3, N14 ..... 5.10
SouthAvis,Pa. J8 ..... 4.35
So.SanFrancisco B3 ...5.00
SparrowsPt., ⅛-1" B2 ..4.35
Williamsport,Pa. S19 ..4.35

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.45
Alton,Ill.(6) L1 ..... 3.45
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 ...4.20
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1.3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 .... 4.05
Lackawanna,N.Y. B2 .. 3.45
LosAngeles B3 ..... 4.15
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 ... 4.25
Niles,Calif. P1 ..... 4.17
Pittsburg,Calif. C11 ... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.20
SandSprings,Okla. S5 .. 4.35
Seattle,Wash. B3, N14..4.20
SouthAvis,Pa. J8 ..... 3.45
So.Chicago,Ill. R2 ..... 3.45
So.Duquesne,Pa. C3..... 3.45
So.SanFrancisco B3 .... 4.20
SparrowsPoint,Md. B2..3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2..... 3.45

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 .. 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2 ..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 .... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1.3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 .. 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. N12 ..... 3.50
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 .... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 .... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 .... 3.35
Youngstown C3, Y1 .... 3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity,Ala. R2 .. 4.50
Dover,O. R1 ..... 4.65
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance,Calif. C11 .... 5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 .... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1.5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna(35) B2 .... 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 ..... 5.05
SparrowsPoint(36) B2 .. 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown, C3, Y1 .... 5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 .... 7.05
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1.6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna(37) B2 .... 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.20
SparrowsPoint(38) B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.10
Cleveland J5, R2	4.10
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Follansbee,W.Va. F4	4.10
Fontana,Calif. K1	5.00
Gary,Ind. C3	4.10
GraniteCity,Ill. G4	4.30
Ind.Harbor,Ind. I-2, Y1	4.10
Irvin,Pa. C3	4.10
Lackawanna,N.Y. B2	4.10
Middletown,O. A10	4.10
Pittsburg,Calif. C11	5.05
Pittsburgh J5	4.10
SparrowsPoint,Md. B2	4.10
Steubenville,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Ycungstown Y1	4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.15
Dover,O. R1	4.75
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O. W10	4.40
Niles,O. N12	4.65
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. C3	6.75
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Niles,O. N12	4.80
Weirton,W.Va. W6	4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville, O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.60
Gary,Ind. C3	6.50
Ind.Harbor I-2	6.50
Irvin,Pa. C3	6.50
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Warren,O. R2	8.10
Yorkville,O. W-10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Culvert. No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T2	5.20	5.45
Gary C3	5.20	5.45
IndianaHarbor I-2	5.20	5.45
Irvin,Pa. C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.45

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.60
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	3.60
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.60
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15
Ind.Harbor,Ind. I-2	4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

SHEETS, Well Casing

Torrance,Calif. C11	4.85

SHEETS, Drum Body

Pittsburg,Calif. C11	4.05
Torrance,Calif. C11	4.05

SHEETS, Aluminized

Butler,Pa. A10	7.75

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	6.70	7.95	8.75
Brackenridge,Pa. A4	...	...	7.20	8.45	9.25
Follansbee F4 (cut lengths)	...	...	6.70	7.95	8.75
GraniteCity,Ill. G4 (cut lengths)	...	...	6.90	8.15	...
Ind.Harbor,Ind. I-2	6.40	6.70	(34)	...	...
Mansfield,O. E6 (cut lengths)	5.90	6.20	6.70	7.95	8.75
Niles,O. N12 (cut lengths)	...	...	6.20	6.70	...
Niles,O. M4 (24 Gage)	5.65	5.95	6.45	...	...
Vandergrift,Pa. C3	...	...	6.70	7.20	8.45	9.25
Warren,O. R2	6.40	6.70	7.20	8.45	9.25
Zanesville,O. A10	...	...	6.70	7.20	8.45	9.25

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.30	9.85	10.55	11.35
Brackenridge,Pa. A4	9.80	10.35	11.05	...
Follansbee F4 (cut length)	9.30	9.85	10.55	11.35
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	...	...	...
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Vandergrift,Pa. C3	12.35	13.20	14.20	14.70

TIN PLATE, American COKE (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4	7.50	7.70
Ind.Harbor I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.40	7.60
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10.	7.30	7.50

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.60
Fairfield,Ala. T2	5.70
Gary,Ind. C3	5.60
GraniteCity,Ill. G4	5.80
Ind.Harbor,Ind. I-2, Y1	5.60
Irvin,Pa. C3	5.60
Niles,O. R2	5.60
Pittsburg,Calif. C11	6.35
SparrowsPoint,Md. B2	5.70
Warren,O. R2	5.60
Weirton,W. Va. W6	5.60
Yorkville,O. W10	5.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary,Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1.	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint, Md. B2.	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15.	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	3.85

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15.	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Conshohocken,Pa. A3	3.35
Detroit M1	3.45
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1.	3.25
KansasCity,Mo.(9) S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11.	3.25
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3, Y1	3.25

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15.	9.50
Pawtucket,R.I.(11) N8.	9.50
Pawtucket,R.I.(12) N8.	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.75

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bridgeport,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.95	6.55	8.50	10.80
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.15	5.95	6.55	8.50	10.80
FranklinPark,Ill. T6	4.40	6.10	6.70	8.65	....
Harrison,N.J. C18	...	...	6.85	8.80	11.10
Mattapan,Mass. T6	4.65	6.25	6.85	8.80	11.10
NewBritn.,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
NewCastle,Pa. B4	4.15	5.95	6.55	8.50	....
NewCastle,Pa. E5	4.15	5.95	6.55	8.50	10.80
NewYork W3	...	6.30	6.90	8.85	11.15
Pawtucket,R. I. N8:					
Cleve.orPitts.Base (29)	4.55	5.50	6.10	8.05	10.35
Worcester,Base (29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	6.25	6.85	8.80	11.10
Wallingford,Conn. W2.	4.65	6.25	6.85	8.80	11.10
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	4.65	6.25	6.85	8.80	11.10
Youngstown C8	4.50	5.95	6.55	8.50	10.80
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	9.30	11.25	13.85
Harrison,N.J. C18	...	...	*9.30*	*11.25*	*13.85*

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	4.15
Berea,O. C7	6.00
Bridgprt,Conn.(10) S15.	4.15
Butler,Pa. A10	4.15
Cleveland A7, J5	4.15
Dearborn,Mich. D3	4.40
Detroit, D2	4.40
Detroit M1	4.35
Dover,O.(40) G6	4.15
Ecorse,Mich. G5	4.35
Follansbee,W.Va. F4	4.15
Fontana,Calif. K1	5.40
FranklinPark,Ill. T6	4.30
Ind.Harbor,Ind. I-2	4.30
Lackawanna,N.Y. B2	4.15
LosAngeles C1	5.50
Mattapan,Mass.(21) T6.	4.65
Middletown,O. A10	4.15
NewBritain(10) S15	4.15
NewCastle,Pa. B4, E5.	4.15
NewHaven,Conn. A7, D2.	4.65
NewYork W3	5.00
Pawtucket,R.I.(11) N8.	4.70
Pawtucket,R.I.(21) N8.	4.65
Riverdale,Ill. A1	4.30
Rome,N.Y. R6	4.15
Sharon,Pa.(30) S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J. (13) R5	4.65
Wallingford,Conn. W2	4.65
Warren,O.(25) T5	4.15
Warren,O. R2	4.15
Weirton,W.Va. W6	4.15
Youngstown C8, Y1	4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.20
Ecorse,Mich. G5	6.40
Fontana,Calif. K1	6.95
Lackawanna,N.Y., B2	6.40
Sharon,Pa. S3	6.20
SparrowsPoint,Md. B2.	6.40
Warren,O. R2	6.20
Weirton,W. Va. W6	6.20
Youngstown Y1	6.20

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	4.15

Key to Producing Companies

A1	Acme Steel Co.
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A7	American Steel&Wire
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
A13	American Cladmetals Co.
B1	Babcock & Wilcox Tube
B2	Bethlehem Steel Co.
B3	Beth.Pac. Coast Steel
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B6	Boiardi Steel Corp.
B8	Braeburn Alloy Steel
B11	Buffalo Bolt Co.
B14	A. M. Byers Co.
C1	Calif. Cold Rolled Steel
C3	Carnegie-Illinois Steel
C4	Carpenter Steel Co.
C5	Central Iron & Steel Div. Barium Steel Corp.
C7	Clev. Cld.Roll.Mills Co.
C8	Cold Metal Products Co.
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia Steel Co.
C12	Columbia Steel & Shaft.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
D2	Detroit Steel Corp.
D3	Detroit Tube & Steel
D4	Disston & Son, Henry
D6	Driver-Harris Co.
D7	Dickson Weatherproof Nail Co.
E1	Eastern Gas&Fuel Assoc.
E2	Eastern Stainless Steel
E4	Electro Metallurgical Co.
E5	Elliott Bros. Steel Co.
E6	Empire Steel Corp.
F2	Firth Sterling Steel
F3	Fitzsimons Steel Co.
F4	Follansbee Steel Corp.
F6	Fretz-Moon Tube Co.
G1	Geneva Steel Co.
G2	Globe Iron Co.
G3	Globe Steel Tubes Co.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
H1	Hanna Furnace Corp.
H4	Heppenstall Co.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
J8	Jersey Shore Steel Co.
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K5	Kidd Drawn Steel Co.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Electric Steel
L5	Lockhart Iron & Steel
L6	Lone Star Steel Co.
L7	Lukens Steel Co.

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Fostoria,O. S1	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Milbury,Mass(12) N6	6.20
Monessen,Pa. P7, P16	*5.90*
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J., A7	6.20
Waukegan,Ill. A7	5.90
Worcester A7,J4,T6,W12	6.20

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	5.35
Buffalo W12	5.35
Cleveland A7	5.35
Crawfordsville,Ind. M8	5.35
Dover,O. G6	5.35
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.35
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7, P16	*5.35*
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester A7, T6, W12	5.65

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.45
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.45
Crawfordsville,Ind. M8	8.45
Fostoria,O. S1	8.45
Johnstown,Pa. B2	8.45
Kokomo,Ind. C16	8.45
Monessen,Pa. P16	*8.45*
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Roebling,N.J. R5	8.75
Waukegan,Ill. A7	8.45
Worcester,Mass. A7, T6	8.75

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland A7, C20	4.50
Crawfordsville,Ind. M8	4.60
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.85
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	5.45
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	5.15
No.Tonawanda B11	4.90
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.45
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. A7, T6	4.80

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Monessen,Pa. P7, P16	*5.55*
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
Roebling,N.J. R5	5.85
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	8.05	8.05	8.30
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.05	8.05	8.30
Johnstown,Pa. B2	8.05	8.05	8.30
Monessen,Pa. P7, P16	*8.05*	*8.05*	*8.30*
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	8.05	8.05	8.30
Portsmouth,O. P12	8.05	8.05	8.30
Roebling,N.J. R5	8.35	8.35	8.60
SparrowsPoint,Md. B2	8.15	8.15	8.40
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. A7	8.35	8.35	8.60
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	8.15	8.15	8.40
Worcester,Mass. J4, T6	8.35	8.35	8.60

WIRE, Merchant Quality (6 to 8 gage

	An'ld	Galv.
AlabamaCity R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.45	5.70
Bartonville(19) K4	5.35	5.60
Buffalo(31) W12	4.50	...
Cleveland A7	5.35	5.60
Crawfordsvil. M8	5.45	5.70
Donora A7	5.35	5.60
Duluth A7	5.35	5.60
Fairfield T2	5.35	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.35	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	5.45	5.70
LosAngeles B3	6.30	...
Minnequa C10	5.60	5.85
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.30	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.35	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	6.30	6.55
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.30	...
Worcester A7	5.65	5.90

WIRE (16 gage)	An'ld. Stone	Galv. Stone
Aliquippa J5	9.80	11.30
Bartonville(1) K4	9.80	11.30
Cleveland A7	9.80	11.30
Crawfrdsvil. M8	9.80	11.30
Fostoria,O. S1	9.90	11.40
Johnstown B2	9.80	11.30
Kokomo C16	9.80	11.30
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	10.15	11.65
Prtsmth.(18) P12	9.80	11.30
SparrowsPt. B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Galv'd ACSR for Cores	
Monessen,Pa. P16	*8.15*
Roebling,N.J. R5	8.45
SparrowsPoint,Md. B2	8.25

WIRE, Tire Bead	
Monessen,Pa. P16	*10.80*
Roebling,N.J. R5	10.80

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Crawfordsville M8	128
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	131
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	146
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS	Col.
Duluth A7	116
Huntington,W.Va. W7	116
Johnstown,Pa. B2	116
Joliet,Ill. A7	116
Minnequa,Colo. C10	121
Moline,Ill. R2	112
So.Chicago R2	116
Williamsport,Pa. S19	120

WOVEN FENCE, 9-15½Ga. Col.

AlabamaCity,Ala. R2	116
Ala.City,Ala.,17-18ga.R2	198
Aliquippa,,Pa.9-14½ga.J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsville,Ind. M8	118
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	121
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	115
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	118
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	137
SparrowsPoint,Md. B2	115
Sterling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville,Ind. M8	108
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	111
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106
Torrance,Calif. C11	126
Worcester,Mass. A7	112

NAILS & STAPLES, Non-Stock	
AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfordsville,Ind. M8	5.45
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.60
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg) To dealers (33)	
Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES	
Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES	
Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.35
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS	
Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated	
Fairfield,Ala. T2	9.10
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.85
Pittsburgh O3, P14	9.10
Seattle B3	9.35

STANDARD TRACK SPIKES	
Fairfield,Ala. T2	5.60
Ind.Harbor,Ind. I-2, Y1	5.60
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.60
Pittsburgh J5	5.60
Seattle B3	6.10
So.Chicago,Ill. R2	5.60
Struthers,O. Y1	5.60
Youngstown R2	5.60

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Huntington,W.Va. W7	...	...	...	3.75
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo.	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, ~~R2~~, S8, T7, U4, V2, V3.

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb. Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg.Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U1 Ulster Iron Works
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

(1) Chicago Base. (2) Angles. (3) Merchant. (4) Reinforcing. (5) Philadelphia del. (6) Chicago or Birm. Base. (7) To jobbers, 3 cols. lower. (8) 16 gage and heavier. (9) 6 in. and narrower. (10) Pittsburgh Base. (11) Cleveland & Pittsburgh Base. (12) Worcester, Mass. Base. (13) 3"& wider; over ½" to under 3" 5.15c. (14) Also wide flange beams. (15) ¼" and thinner. (16) 40 lb and under. (17) Flats only. (18) To dealers. (19) Chicago & Pittsburgh Base. (20) Deduct 0.25c for untreated. (21) New Haven, Conn. Base. (22) Del. San Fran. Bay area. (23) Angles 1"x1" to 1¼"x1¼" only. (24) Deduct 0.35c for finer than 15 Ga. (25) Up to 0.035 C; 4.40c, 0.035 C and over. (26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.58c. (28) Bonderized. (29) 0.26-0.40 C. (30) 0.40 C and less. (31) Not annealed. (32) Untreated. (33) To jobbers, deduct 20 cents. (34) 6.70c for cut lengths. (35) 72" and narrower. (36) 54" and narrower. (37) 15 Ga. & lighter; 60" & narrower. (38) 14 Ga. & lighter; 48" & narrower. (39) 48" and narrower. (40) Lighter than 0.035"; 4.40c, 0.035" and heavier. (41) Flats. (42) Bands.

STANDARD PIPE, T. & C.

BUTTWELD Size	List	Pounds	Carload Discounts from List, % —Black—			—Galvanized—		
Inches	Per Ft	Per Ft	A	B	C	D	E	F
⅛	5.5c	0.24	36.5	34.5	35.5	8.5	9	7.5
¼	6.0	0.42	33.5	31.5	32.5	9.5	11	8.5
⅜	6.0	0.57	29	27.	28	5.5	8	4.5
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.00	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana,Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E; Sparrows Point Md. B2.

Columns C & F; Indiana Harbor, Ind., ½" through 3", Y-1; Alton, Ill. (Lorain, O., base) L1 quotes 2 points lower on ⅛", ¼", ⅜".

Column D; Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜", W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size	List	Pounds	Carload Discounts from List, % Seamless		Elec. Weld	
			Black	Galv.	Black	Galv.
Inches	Per Ft	Per Ft	A	B	C	D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D; Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D.	B.W.	—Seamless—		Elec. Weld	
In.	Ga.	H.R.	C.D.	H.R.	C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1¾	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2¼	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

	—Plates—		—Strip—		—Sheets—		
Cladding	Carbon Base		Cold-Rolled Carbon Base		Carbon Base		Copper Base
Stainless	10%	20%	10%	Both sides	10%	20%	Both Sides
302 ...	....	....	....	....	19.75	21.50–22.50	75.00
304 ...	22.50	26.50	....	....	20.75	22.50–24.00	77.00
305 ...	....	....	....	....	....	....	79.00
309 ...	27.00	31.00	....	....	....	....	....
310 ...	32.50	36.50	....	....	....	....	105.00
316 ...	27.00	31.00	....	....	26.00	28.00–32.00	....
317 ...	30.50	34.50	....	....	....	....	....
318 ...	25.50	33.50	....	....	....	....	....
321 ...	23.50	27.50	....	....	23.00	25.00	90.00
347 ...	25.00	29.00	....	....	24.00	26.00–30.00	94.00
405 ...	18.75	24.75	....	....	....	....	....
410 ...	18.25	24.25	....	....	....	....	....
430 ...	18.25	24.25	....	....	....	....	....
Nickel.	27.50	34.50	31.50	41.00	....	....	88.00
Inconel.	36.00	46.00	....	....	....	....	115.00
Monel .	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Dexodized. † Deduct 4.25c for hot-rolled. Production points for carbon base products; Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 27
- ⅝-in. & ⅝-in. 29
- ¾-in. and larger 26

Longer than 6 in.:
- All diams. 22

Lag bolts, all diams.:
- 6 in. and shorter 30
- over 6 in. long 28

Ribbed Necked Carriage. 26
Blank 40
Plow 40
Step, Elevator, Tap, and Sleigh Shoe 28
Tire bolts 20
Boiler & Fitting-Up Bolts 37

NUTS

H.P. & C.P. Reg. & Heavy Square:
- ½-in. and smaller ... 25
- ⅝-in. & ⅝-in. 23
- ¾-in.-1½-in. 23
- 1⅝ in. and larger 16

H.P. Hex.:	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ⅝-in..	28	25
¾-in.-1½-in. ..	25	23
1⅝ in. & larger	17	16

C.P. Hex:
- ½-in. & smaller 33 29
- ⅝-in. & ⅝-in.. 30 27
- ¾-in. & 1½ in. 27 24
- 1⅝ in. & larger 20 17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or key quantities)

	Hvy.	Reg.	Lght.
½-in. and smaller ...	35	41	41
⅝-in. & ⅝-in.	30	36	36
¾-in.-1½ in..	27	31	33
1⅝-in.&larger	17	21	..

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 63.5 & 10
Plated finishes ... 50 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ¼-in. through ⅝-in.. 50
- ¾-in. through 1 in.. 43

Longer than 6 in.:
- ¼-in. through ⅝-in.. 33
- ¾-in. through 1 in.. 13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter 46
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41
¼-in. diam. & larger ... 24
N.F. thread, all diams. . 18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.25c
⅞-in., under .....43 off

Washers, Wrought

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

—Inches— Diam.	Length	Cents per lb
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4, 5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

STAINLESS STEEL

(cents per pound)

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.
Baltimore, bars, wire and structurals A10.
Brackenridge,Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.
Cleveland, strip, except Type 309 quoted 51.00c and except Type 416 A7.
Detroit, strip, except Type 309 M1.
Dunkirk,N.Y. bars, wire A4.
Duquesne, Pa., bars C3.
Gary, Ind., sheets except Type 416 C3.
Harrison, N. J., strip C18.
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.
McKeesport, Pa., bars; sheets except Type 416, C3.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars C3.
Pittsburgh, sheets C18.
Reading, Pa., bars & strip except Type 309 bars quoted 41.00c C4.
So. Chicago, Ind., bars & structurals C3.
Syracuse, N. Y., bars wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.
Washington, Pa., bars sheets & strip except Type 309 strip quoted 51.00c J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c, strip 60.00c W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7
West Leechburg, Pa., strip, type 309 quoted 51.00c A4.
Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 22.00
Toluol, one deg. .19.00-24.75
Industrial xylol. .20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia .$45.00

Cents per pound, ovens

Phenol, 40 (carlots, returnable drums) 13.50
Do., less than carlots .14.25
Do., tank cars 12.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.
Imported, net ton, duty paid, metallurgical grade, $39-$40.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots..	15.00
Swedish, c.i.f. New York, in bags..	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns..	70.00-135.00
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500 lb drums, freight allowed	30.00
Brass, 10-ton lots.	23.25-26.25
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh....	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302...	75.00
Tin	86.50
Zinc, 10-ton lots..	15.25-18.00
	Dollars
Tungsten:	
99%, minus 80 to 200 mesh, freight allowed, over 1000 lb	2.90
1000 lb	2.95
less than 1000 lb..	3.00
98.8%, minus 65 mesh, freight allowed. 1000 lb and over..	2.90
less than 1000 lb..	3.00
Molybdenum:	
99%, minus 80 to 200 mesh, over 500 lb.....	2.25
200 to 500 lb	2.60
less than 200 lb...	2.75
82-88%, freight allowed. 2000 lb and over..	2.40
less than 2000 lb..	2.45
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur. .$14.00-14.50
Connellsvll,fdry. .15.50-16.50
New River, foundry ...19.00
Wise county, foundry ...15.95
Wise county, furnace ...15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens .$22.00
Everett, Mass., ovens New England, del.‡ .22.70
Chicago, ovens 21.00
Chicago, del. .....‡22.45
Detroit, del. 24.91
Terre Haute, ovens....21.20
Milwaukee, ovens 21.75
Indianapolis, ovens 20.75
Chicago, del. 24.12
Cincinnati, del. 23.67
Detroit, del. 24.65
Ironton, O., ovens 20.40
Cincinnati, del. 22.71
Painsville, O., ovens..21.90
Buffalo, del. 24.02
Cleveland, del. 23.62
Erie, del. 22.04
Birmingham, ovens 18.70
Philadelphia, ovens ...20.45
Neville Island, Pa., ovens 20.00
Swedeland, Pa., ovens .20.40
Portsmouth, O., ovens.19.50
Detroit, ovens 21.65
Detroit, del. 22.65
Buffalo, del. 24.00
Flint, del. 24.09
Pontiac, del. 23.04
Saginaw, del. 24.40

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York (c'try)	5.55	6.64	7.00	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city)	5.93	6.68	7.19	5.98	...	5.80	6.50	8.70	5.75	6.08	7.28
Boston (c'try)	5.73	6.48	6.99	5.78	...	5.60	6.30	8.50	5.55	5.88	7.08
Phila. (city)	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try)	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city)	5.25	6.69	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try)	5.05	6.49	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va.	6.10	...	...	...	...	6.15	7.20	...	6.20	6.15	7.55
Wash. (w'hse)	5.46	...	...	6.00	...	5.90	6.62	...	5.90	5.61	7.25
Buffalo (del.)	5.25	6.00	7.00	5.61	...	5.25	5.95	10.10††[5]	5.35	5.65	6.95
Buffalo (w'hse)	5.05	5.80	6.80	5.41	...	5.05	5.75	9.90††[5]	5.15	5.45	6.75
Pitts. (w'hse)	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse)	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse)	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse)	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[5]	5.44	5.59	6.75
Chicago (city)	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[5]	5.05	5.20	6.40
Milwaukee (city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[5]	5.39	5.54	6.74
Milwau. (c'try)	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[5]	5.19	5.34	6.54
St. Louis (del.)	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03††[5]	5.53	5.68	6.88
St. L. (w'hse)	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88††[5]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[2]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'ham (w'hse)	5.05[10]	5.80	6.15[2]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr.	6.13†	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.95	7.15	7.60	6.00	8.25	5.95	7.70	...	5.85	5.95	8.15
L. A. (w'hse)	5.80	7.00	7.45	5.85	8.10	5.80	7.55	...	5.70	5.80	8.00
San Francisco	6.25[9]	8.60[2]	7.50[2]	6.75[9]	8.25[3]	6.15[9]	7.80[8]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma	6.70[2]‡	8.15[3]	...	6.90	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse)	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inclusive.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $106. Hard-fired, $141 at above points.

High-Heat Duty: Salina, Pa. $91; Woodbridge N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Fire at Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., Chester, W. Va., New Cumberland, W. Va., $60.

Wire Cut: Chester, W. Va., Wellsville, O., New Cumberland, W. Va., $58.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite,* $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, 3/8" grains; bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millvale, W. Va., Narlo, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After Jan. 25, 1950, increases or decreases, if any, in upper lake rail freight, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$8.10
Old range nonbessemer	7.95
Mesabi bessemer	7.85
Mesabi nonbessemer	7.70
High phosphorus	7.70

EASTERN LOCAL ORE

Cents per unit, del E. Pa.

Foundry and basic 56.62% concentrates contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$17.00-18.00
45% no ratio	17.00-18.00
48% no ratio	26.00-27.00
50% no ratio	27.00-27.50

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	25.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, cl., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 35.5c; ton lot 31.25c, less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered: Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page* 133)

Nonferrous Outlook Bright

Rise of industrial production rate and high level of business activity generating good demand for nonferrous metals and products over the next several months

HIGH LEVEL industrial production and business activity are keeping the outlook reasonably bright for producers of nonferrous metals and nonferrous products.

STEEL'S latest industrial production index in recovering from effects of the coal miners' strike has bounded to a level equal to the highest point attained in 1949.

New nonfarm housing starts in February about matched January's 80,000, making a total for those two months 160,000—60 per cent ahead of the corresponding period of last year. And the National Association of Real Estate Boards gives you reason to expect continued good performance in the housing field. A survey by that organization discloses that in 83 per cent of 470 reporting cities the number of new houses to be constructed in 1950 will at least equal the alltime record set in 1949.

A leading producer of appliances sees demand for its products in the last half of the year as good as that in the first half, and with few exceptions makers of leading brands of appliances have been unable to meet the strong consumer demand thus far this year.

Automobile output is not only rising but the total of cars turned out this year is 20 per cent ahead of that for the corresponding period of last year, even though one of the "Big Three" producers has been strikebound. Spring and summer have always been regarded as good for a fillip to the auto business.

Nonferrous Orders Up

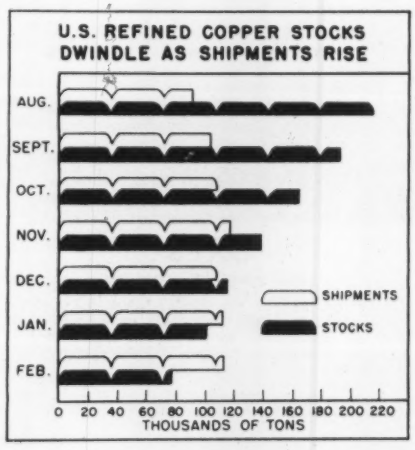
Another measurement of "things to come" is the Commerce Department's figures on new orders received by manufacturers. They too show reasons for optimism. In January, new orders for nonferrous metals and their products rose to $564 million, a level exceeded in only five months of 1949. In addition, the value of all orders received by manufacturers (durable goods and nondurables) was higher in January than in all but one month of last year. Although these statistics are several weeks old they foretell the production levels for several months, for any change in production is necessarily preceded by a change in the trend of orders.

All of these bullish signs plus numerous others that could be cited add up to a good demand for nonferrous metal products.

Copper, Brass Business Good

Reflecting good demand for copper and brass, the orders placed for delivery of refined copper in March had by early last week risen to around 106,000 tons, not far below totals for January and February. Sales for April delivery had reached 55,000 tons. As a result of fairly active demand the price situation remains firm at 18.5 cents a pound for electrolytically refined copper delivered Connecticut valley.

Rise since last July in shipments of refined copper in the United States has been accompanied by a continued decline in stocks of refined copper in the hands of domestic producers (see accompanying chart). Stocks



at the end of February, says the Copper Institute, were down to 77,472 tons, lowest since last April.

While refiners' stocks declined in February fabricators' stocks of refined copper rose 9437 tons to 363,924 tons at the end of the month. Unfilled orders held by fabricators at the end of February required 195,860 tons of refined copper. That was an increase of 19,934 tons over January.

Fabricators' copper consumption of 102,896 tons in February was 6025 tons below that in January, but with February being the shorter month its daily rate of consumption was approximately 160 tons greater than that of January.

Copper content of products sold by fabricators in February toaled 122,830 tons, an increase of 27,390 tons over January.

Although copper is in good demand, brass mills have not found too much difficulty in locating enough copper to keep going. Brass ingot is reported still easy to get. Brass rod deliveries run up to two weeks or a little longer on small sizes. Some of the larger sizes are in stock at some mills for quick delivery. Brass and copper tube deliveries are four to six weeks, and brass sheet four to six weeks, depending on the mill where order is placed.

Per capita consumption of copper is increasing, Revere Copper & Brass Inc. points out in its annual report. It now is about 18 pounds a year, compared with 12.2 pounds in 193[illegible]. Total copper requirements have been boosted not only by the per capita increase but also by a rise in the population.

Freight Rates Cut on Copper

Freight rate cuts on copper bars, coils, ingots, pigs or slabs, and wire bars or rods have been announced by the Pacific Coast-European Conference.

The reductions effective Mar. 8 are: $3.98 per long ton, contract, to Group 2 Continental ports; $2.98 contract and $3.31 noncontract to Denmark; $1.18 contract and $1.51 noncontract to Norwegian and Swedish terminal ports; $4.28 contract and $4.61 noncontract to western Mediterranean ports, Group 4; and $4.48 contract and $4.81 noncontract to North Africa and eastern Mediterranean.

No change was made in the United Kingdom tariff on these commodities. The new copper rates range from $15 and $18.35 to $20 and $23.25 in the various group destinations.

Lead Sales Lagging

Recent price decreases on lead have failed to stimulate sales. Apparently expecting a further decrease in view of continued large supplies of foreign lead offered on the U. S. market, consumers are following a cautious buying policy and keeping inventories down and calling for prompt shipment.

Weak undertone of the lead market could be changed quickly by possible work stoppages at lead mines and plants in Mexico, an important supplier to the U. S. Labor contracts in Mexico are reconsidered every two years. When contracts were negotiated in 1948, conferences bogged down and important mines and plants were idle several weeks.

Contributing to the easing in the lead market is a seasonal decline in replacement battery business. Producers shipped 1,159,000 replacement batteries in February, compared with 1,467,000 in January.

Zinc in Strong Demand

Galvanizers and brass mills continue to provide good demand for zinc and with supplies limited there has been some speculation that another price rise may be in the making. Sellers are reported to be reluctant to book orders for May and June deliveries, for they are pretty fully sold up for April shipment and want to hold on to their remaining supplies awhile to see what further market and price developments there may be.

Tin Price Moves Actively

Freed from price pegging by the Reconstruction Finance Corp., tin has been showing considerable price movement. Most of the price activity results from demand from dealers and professionals, the demand from industrial consumers being negligible.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.
Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 10.00c, brass special 10.25c, intermediate 10.50c, East St. Louis; high grade 11.10c, delivered.

Lead: Common, 10.30c; chemical, 10.40c; corroding, 10.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.00-16.50c; No. 12 foundry alloy (No. 2 grade) 15.50-16.00c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.25-17.75c; grade 2, 16.75-17.25c; grade 3, 15.25-15.75c; grade 4, 14.75c-15.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt del., 77.75c; March del. 77.75c; April del. 77.12½c; May del. 76.87½c; June del. 76.75c. Chinese 99% tin, prompt del., nominal.

Antimony: American 99-99.8% and over but not meeting specifications below 24.50c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 25.00c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, 23.00c; English, Belgian, prompt, 23.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.
Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-99%, $1.80 per lb for 550 lb (keg); $1.80 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.
Silver: Open market, New York, 73.25c per oz.
Platinum: $66-$69 per ounce.
Palladium: $24 per troy ounce.
Iridium: $100 per troy ounce.
Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95%, 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.
Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.
Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.
Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) **Sheets:** Full rolls, 140 sq ft or more, $15.50 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $15.50 per cwt. Traps and bends: List price plus 37%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled, 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

DAILY PRICE RECORD

1950	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 23	18.50	10.30	10.00	77.75	17.00	24.50	40.00	73.25
Mar. 21-22	18.50	10.30	10.00	77.12½	17.00	24.50	40.00	73.25
Mar. 20	18.50	10.30	10.00	76.25	17.00	24.50	40.00	73.25
Mar. 17-18	18.50	10.30	10.00	76.00	17.00	24.50	40.00	73.25
Mar. 16	18.50	10.30	10.00	77.00	17.00	24.50	40.00	73.25
Mar. 15	18.50	10.30	10.00	76.50	17.00	24.50	40.00	73.25
Mar. 14	18.50	10.30	10.00	75.50	17.00	24.50	40.00	73.25
Mar. 13	18.50	10.80	9.75	74.75	17.00	24.50	40.00	73.25
Mar. 9-11	18.50	10.80	9.75	74.625	17.00	24.50	40.00	73.25
Mar. 6-8	18.50	11.80	9.75	74.625	17.00	24.50	40.00	73.25
Mar. 2-4	18.50	11.80	9.75	74.50	17.00	24.50	40.00	73.25
Mar. 1	18.50	11.80	9.75	74.375	17.00	27.25	40.00	73.25
Feb. Avg.	18.50	11.80	9.75	74.352	17.00	27.318	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.
Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c; oval 28.34c; cast 26.87c.
Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.
Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.
Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.
Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.
Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl. 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.
Tin Anodes: Bar, 1000 lb and over 91.00c; 500 to 999 lb, 91.5c; 200 to 499 lb, 92.00c; less than 200 lb, 93.5c; ball, 1000 lb and over, 93.25c; 500 to 999 lb, 93.75c; 200 to 499 lb 94.25c; less than 200 lb, 95.75c f.o.b. Sewaren, N. J.
Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 58.2c; 100 or 300 lb drums only, 100 to 500 lb, 49.9c; 600 to 1900 lb, 47.6c; 2000 to 9900 lb, 45.8c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.
Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.
Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 84.50c; more than 2000 lb, 82.50c, f.o.b. Carteret, N. J.
Stannous Chloride (Anhydrous): In 400 lb bbl, 70.80c; 100 lb kegs 71.80c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%..	14.50	14.25	7.25
Phos. bronze, A.....	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze ..	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; composition red brass 12.50; radiators 10.00; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.50-13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 13.50-13.75; No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00; auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.
Lead: Heavy 8.00-8.25c; battery plates 3.50-3.75; linotype and stereotype 8.75-9.00; electrotype 8.25-8.50; mixed babbitt 8.00-8.25.
Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.
Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00; No. 1 babbitt 30.00-32.00.
Aluminum: Clippings 2S nominal; old sheets nominal; crankcase nominal; borings and turnings nominal.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Mar. 23, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Mar. 23	$28.66
Mar. 16	28.00
Feb. 1950	27.52
Mar. 1949	34.60
Mar. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$32.00
No. 2 Heavy Melt.	29.00
No. 1 Busheling	32.00
No. 1 Bundles	32.00
No. 2 Bundles	24.00-25.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	26.00-27.00
Machine Shop Turnings	22.00-22.50†
Mixed Borings, Turnings	22.00-22.50†
Short Shovel Turnings	25.00
Cast Iron Borings	24.00-25.00
Low Phos. Steel	*34.50-36.00*

Cast Iron Grades*

No. 1 Cupola Cast	34.00-35.00
No. 1 Machinery Cast	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*33.00-33.50*
Axles	35.00-36.00
Rails, Random Lengths	35.50-36.00
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	35.50-36.00
Angles, Splice Bars	37.00-38.00*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Busheling	28.00-28.50
No. 1 Bundles	28.00-28.50
No. 2 Bundles	22.00-22.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	21.00-21.50
Short Shovel Turnings	21.00-21.50
Cast Iron Borings	21.00-21.50
Low Phos.	29.00-29.50
Cut Structurals	31.00-31.50

Cast Iron Grades

No. 1 Cupola	42.00-43.00
Charging Box Cast	38.00-39.00
Stove Plate	35.50-36.50
Heavy Breakable Cast	32.00-32.50
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	42.50-43.50
No. 1 Wheels	36.50-37.00
Burnt Cast	33.00-33.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	41.00-42.00
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	41.00-41.50

VALLEY

No. 1 Heavy Melt. Steel	$31.50-32.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Bundles	31.50-32.00
No. 2 Bundles	24.50-25.50
Machine Shop Turnings	21.50-22.50
Short Shovel Turnings	23.50-24.00
Cast Iron Borings	23.50-24.00
Low Phos.	32.50-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-33.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$25.00*
No. 2 Heavy Melt. Steel	*23.00*
No. 1 Busheling	*23.00*
No. 1 Bundles	*25.00*
No. 2 Bundles	*19.50-20.00*
Machine Shop Turnings	*18.00*
Short Shovel Turnings	*19.50*
Mixed Borings, Turnings	*17.00*
Low Phos. Punchings and Plate, elec. fur. grade	*28.00-29.00*
Cut Structurals	25.50-26.00
Elec. Furnace Bundles	*26.50*
Heavy Turnings	*25.00*
No. 1 Chemical Borings	29.00
Knuckles and Couplers	*30.00*
Steel car wheels	*30.00*

Cast Iron Grades

No. 1 Cupola Cast	*31.00-33.00*
No. 1 Machinery Cast	36.00-37.00
No. 1 Yard Cast	30.00
Charging Box Cast	34.00-35.00
Heavy Breakable Cast	34.00-35.00
Unstripped Motor Blocks	25.00
Clean Auto Cast	36.00-37.00
No. 1 Wheels	38.00
Malleable	39.00-40.00

CINCINNATI

No. 1 Heavy Melt. Steel	$27.00
No. 2 Heavy Melt. Steel	23.00
No. 1 Busheling	27.00
No. 1 Bundles	27.00
No. 2 Black Bundles	23.00
No. 3 Bundles	18.00
Machine Shop Turnings	14.00
Short Shovel Turnings	17.00
Mixed Borings, Turnings	16.00
Cast Iron Borings	17.00

Cast Iron Grades

No. 1 Cupola Cast	38.00
Charging Box Cast	36.00
Stove Plate	28.00
Heavy Breakable Cast	32.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	38.00
Drop Broken Cast	42.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	33.00
Rails, Rerolling	34.00
Rails, Random Lengths	33.00
Rails, 18 in. and under	42.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$21.00-22.00
No. 1 Bundles	25.00-26.00
No. 2 Bundles	20.00-21.00
No. 1 Busheling	24.00-25.00
Machine Shop Turnings	13.00-14.00
Mixed Borings, Turnings	13.00-14.00
Short Shovel Turnings	15.00-16.00
Cast Iron Borings	16.00-17.00
Punchings & Plate Scrap	24.00-25.00

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$28.00-28.50
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	*36.00-37.00*
No. 1 Cupola	*31.50-32.50*
Stove Plate	*30.50-31.50*
Malleable	*31.50-32.50*

Railroad Scrap

Rails, 2 ft. and under	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$21.50-22.00
No. 2 Heavy Melt. Steel	*18.00-18.50*
No. 1 Busheling	*18.00-18.50*
No. 1 Bundles	21.50-22.00
No. 2 Bundles	*16.00-16.50*
Machine Shop Turnings	11.00-11.50
Mixed Borings, Turnings	11.00-11.50
Short Shovel Turnings	12.50-13.00
Punchings & Plate Scrap	*22.50-23.00*
Cut Structurals	*22.50-23.00*
Elec. Furnace Bundles	21.50-22.00

Cast Iron Grades

No. 1 Cupola Cast	*26.00-26.50*
No. 1 Machinery	26.00-27.00
Charging Box Cast	26.00-26.50
Heavy Breakable	26.00-26.50
Unstripped Motor Blocks	20.00
Malleable	34.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$20.00-20.50
No. 2 Heavy Melt. Steel	17.00-17.50
No. 1 Bundles	19.00-20.00
No. 1 Busheling	19.00-19.50
Machine Shop Turnings	11.00-11.50
Mixed Borings, Turnings	10.50-11.00
Short Shovel Turnings	13.00-13.50
Bar Crops and Plate	21.00-22.00
Punchings & Plate Scrap	21.00-22.00
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	27.50-30.50
Mixed Cast	21.00-22.00
Heavy Breakable Cast	24.50-25.50
Stove Plate	21.50-22.50
Unstripped Motor Blocks	17.50-18.50

CHICAGO

No. 1 Heavy Melt. Steel	*$29.00*
No. 2 Heavy Melt. Steel	*27.00*
No. 1 Bundles	*29.00*
No. 2 Bundles	*25.00*
Machine Shop Turnings	17.00-18.00
Mixed Borings, Turnings	19.00-20.00
Short Shovel Turnings	20.00-21.00
Cast Iron Borings	19.00-20.00
Low Phos.	30.50-31.50
Elec. Furnace Bundles	*28.00-29.00*
Heavy Turnings	23.00-24.00
Cut Structurals	*30.00-30.50*

Cast Iron Grades

No. 1 Cupola Cast	40.50-41.50
Clean Auto Cast	41.50-42.50
No. 1 Wheels	36.00-37.00
Stove Plate	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	*30.00-30.50*
Malleable	*39.00-40.00*
Rails, Rerolling	45.00-46.00
Rails, Random Lengths	35.00-36.00
Rails, 2 ft and under	*41.00-42.00*
Rails, 18 in. and under	*42.00-43.00*
Railroad Specialties	32.00-33.00
Angles, Splice Bars	*34.00-35.00*

*Nominal.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$24.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	22.00
No. 2 Bundles	20.00
Machine Shop Turnings	*19.50*
Mixed Borings, Turnings	17.00
Short Shovel Turnings	23.00
Cast Iron Borings	19.00
Bar Crops and Plate	27.00-28.00
Cut Structurals	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00
Stove Plate	30.00
No. 1 Wheels	*30.50-31.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00-26.00
R.R. Malleable	nominal
Rails, Rerolling	33.00-35.00
Rails, 3 ft and under	nominal
Angles and Splice Bars	nominal

ST. LOUIS

No. 1 Heavy Melt. Steel	$28.00-29.00
No. 2 Heavy Melt. Steel	24.00-25.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	*32.00-33.00*
Heavy Breakable Cast	29.00-30.00
Brake Shoes	29.00-30.00
Clean Auto Cast	36.00-38.00
Burnt Cast	*29.00-30.00*

Railroad Scrap

R.R. Malleable	31.00-33.00
Rails, Rerolling	40.00-41.00
Rails, Random Lengths	30.00-31.00
Rails, 3 ft. and under	*37.00*
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	30.00-31.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos 1 & 2 Bundles	16.00
No. 3 Bundles	13.00
Machine Shop Turnings	9.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	27.50
Cut Structurals	27.50

Cast Iron Grades

No. 1 Cupola Cast	25.00-27.50
Heavy Breakable Cast	25.00
Stove Plate	25.00
Unstripped Motor Blocks	18.00
Malleable	25.00
Brake Shoes	20.00
Clean Auto Cast	27.50
No. 1 Wheels	27.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	9.00
Mixed Borings, Turnings	9.00
Punchings & Plate Scrap	26.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades

Cast	40.00-43.00*

* F.o.b. shipping point.

Sheets Strip . . .

Sheet and Strip Prices, Page 113 & 114

Chicago — Supply-demand balance now is not expected until third quarter, and some trade authorities see no sign of let-up in demand before end of that period. A few are unqualifiedly optimistic through the entire year. Many companies went into the coal-strike period with overflowing order books, and strike-lost tonnage accentuated their supply problem.

The shortage is causing inconvenience and in a few cases hardship among users. All producers have some type of allocation program in effect for flat-rolled products.

If freight absorption is allowed, consumers are confident the present bleak outlook for relatively quick improvement in local steel supply will evaporate.

Chicago district sheet mills are expected to be operating at full capacity when other area producers are seeking business. From Chicago steel producers' standpoint absorption of freight would probably be undertaken only cautiously and experimentally. Invasion of eastern territory would probably be limited to Detroit and Ohio markets.

New York—Increasing number of sellers of hot and cold sheets are withdrawing from the market. In most cases they are overbooked. Actually some sellers on the basis of present outlook are booked into third quarter. Even on specialties deliveries are extended.

Boston — Second quarter carbon sheet deliveries will be set back to the extent carryovers take up capacity for that period. Heavy demand for flat-rolled is marked by increase in orders for hot-rolled with some tonnage booked for July. Galvanized and cold-rolled tonnage has accumulated in larger volume for third quarter rolling.

Pittsburgh—Distribution of all hot and cold-rolled sheet and strip classifications on district office quota basis is now in effect among major producers. Record appliance production accounts for high level of electric motor output and therefore well sustained demand for silicon steels. Demand for enameling stocks similarly is favorably stimulated by high level output of stoves, washing machines, dryers, etc. Grain storage program is expected to keep galvanized sheets in short demand throughout third quarter. Sellers are generally optimistic over demand outlook through second quarter and some are predicting full production schedules throughout most of the third quarter.

Philadelphia — Most sheet sellers are well booked up for second quarter in specialties as well as major grades. Deliveries on stainless steel sheets and strip in some cases now extend into third quarter. One large producer is under such pressure for stainless strip that it is now rolling some tonnage on its sheet mill in an effort to get caught up.

Some mills have enough business in certain major grades to keep them going for the next five to six

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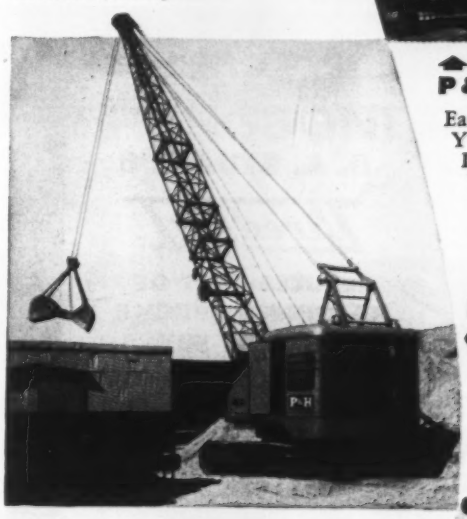

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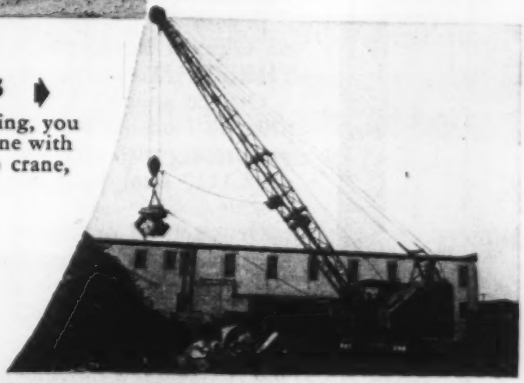

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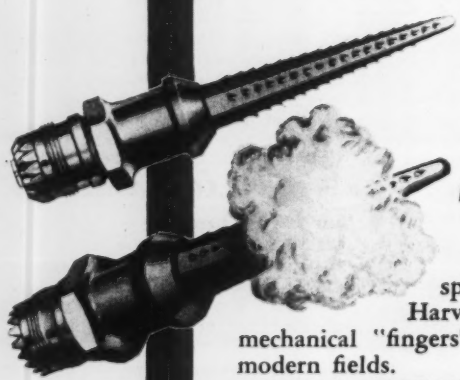

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months, assuming no cutbacks, and have withdrawn from the market.

Cleveland — Sheet deliveries now extend well into summer. Producers are not accepting new tonnage for third quarter and books are not likely to be opened for that period until the mills can determine the extent of second quarter carryover. Arrearages from first quarter will be heavier than anticipated earlier because of production lost during the coal strike. Meanwhile, consumer pressure for shipments is increasingly insistent, and producers are holding rigidly to established quotas. Indications are little, if any tonnage now moving, is going into consumer inventories. Despite the strong appearance of demand a note of apprehension for the summer months persists in the market.

Cincinnati—Rolling schedules are pushed to the limit. Pressure for tonnage is strong, and demand broad. Automobile manufacturers are avid for tonnage.

Birmingham—Sheet production remains at capacity, but continues behind demand.

St. Louis—Strong demand for cold-rolled sheets continues. Second quarter rolling schedules are filled with customers allocated to approximately 60 per cent of what they would like to receive. Quotas will extend into third quarter especially if Granite City Steel Co. fails to catch up on production lost during recent breakdown in its hot strip mill. It is now three weeks behind on deliveries.

Producers and consumers are planning operations against the possibility of a post-midyear turndown in business. Early in the year they believed sheet demand might be caught up by late summer and they are not yet ready to abandon the idea. Mills' conversion business is easing off.

Granite City Steel's tin plate line will resume Apr. 1 with a 50 to 60 per cent capacity increase.

Los Angeles—Outlook for supplies of flat-rolled products is not encouraging. Deliveries are more extended, with hot-rolled sheet January deliveries in some instances moved back to August.

San Francisco — Demand remains heavy, but pressure is less insistent. The gap between supply and demand is closing in this area.

Wire . . .

Wire Prices, Page 115

Chicago—Distributors' stocks of merchant wire products are thought inadequate for the expected spring rush. Nails are most critically short, followed by fencing. Welded fabric orders are relatively good and mounting, and sales of wire rope are increasing. Sales volume of bale ties is not running up to expectations, but greater than anticipated demand for automatic baling wire is reported.

Birmingham — Wire products demand is brisk. Farm fence is moving actively and there is better than usual requirements in manufacturers' wire. Nails are in reasonably good supply although the more popular sizes are still scarce.

Structural Shapes . . .

Structural Shape Prices, Page 113

New York—Structural orders are spotty but there is an increasing amount of new inquiry. Most is bridge work, for public account. Shape mills are accumulating an increasing amount of tonnage, reflecting slightly more extended delivery promises.

Boston—Price war among fabricators results from competition for tonnage. Prime contractors are frequently able to get lower prices than original estimates. Fabricating, erecting and painting are all competitive. Bulk of tonnage estimated is for public works. Inquiry is out for first of two piers, Boston, taking nearly 3500 tons. West End Iron Works booked state bridges, Massachusetts, aggregating 1170 tons.

Pittsburgh—Fabricators note moderate improvement in inquiries from private sources. Keen competition exists for new work with price shading frequent. Carnegie-Illinois Steel Corp. has re-established quotas among district offices on wide flange beams and standard plates.

Philadelphia — Bridgework is beginning to break rapidly. Bids have been closed on several sizable jobs and early action is pending on others. Private work is only fair. Backlogs at some shops are up for the first time in months. Phoenix Iron & Steel Co., Phoenixville, Pa., is revising size extras, effective Apr. 1,

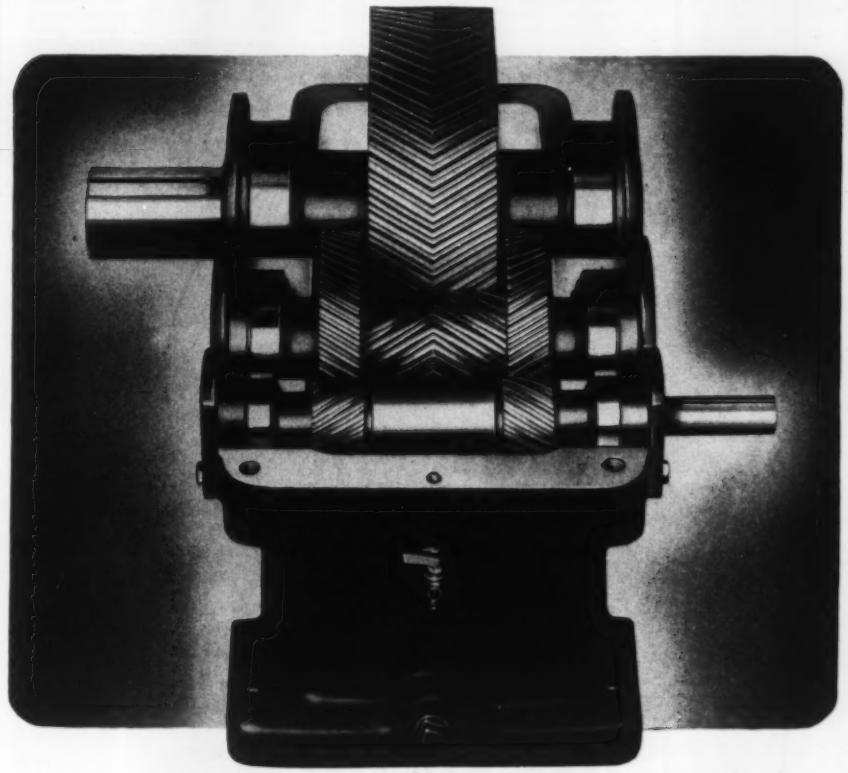
Cleveland—Fair tonnage is being placed with fabricators, mostly small jobs. Largest shape tonnage placed recently involved 5000 tons for the engine plant to be built here by Ford Motor Co. This tonnage went to Bethlehem Steel Co. Also placed last week were 500 tons for a boiler house for the Ford project. This tonnage was taken by the Steel Construction Co., Birmingham, Ala.

Fabricators here are in receipt of offers of Belgian and German steel which is claimed will meet ASTM specifications. This material is being offered at very attractive prices delivered in Cleveland. For example, 4 x 3 x ¼ angles are offered for delivery by vessel in Cleveland from Belgium at 3.89c. This contrasts with 4.22c delivered Cleveland on tonnage from Pittsburgh mills.

Chicago—Plain structural material is available from district mills in late second quarter and from eastern mills in six weeks in some instances. Fabricating shops are not disposed to increase inventories. They list wide flange beams as the outstanding exception to ample stocks. Many shops report contracts are going for unreasonably low prices, some bids being made which seem to involve loss.

Los Angeles—Standard structurals are in good supply with demand spotty. Continuation of heavy construction has resulted in shortage of wide-flanged structurals. The seven far western states appear headed for record building activity.

Seattle — Fabricators report fair operations, small projects predominating. Interest centers in 1500 tons for the Washington state Longview bridge approaches.



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Warehouse . . .

Warehouse Prices, Page 117

Philadelphia — Importation of foreign steel is causing increasing concern among warehouses. To date, competition hasn't been too noticeable but there is a feeling if the current upward trend continues it will make itself felt.

Foreign imports are coming in not only along the eastern seaboard but at southern and western ports as well. Belgium is by far the largest exporter to this country, shipping in sizable quantities of wire rods, deformed bars and reinforcing steel, bar angles, rounds and flats. Some strip also is being brought in, but little in the way of sheets.

New York—Foreign bars and strip are being offered here for delivery in six weeks, prices ranging 20 to 25 per cent under the domestic market. Material is appearing in increasing volume in some of the smaller warehouses.

Cleveland—Local steel distributors are entertaining substantial order volume. Buying appears slightly more spirited since end of the coal strike, being stimulated by increasing talk of extended mill deliveries and the more optimistic view of general business conditions after midyear now prevailing. Seasonal expansion in building and continued high-level auto production also are factors for more active consumer interest. Warehouse stocks are in fair balance in most products with the exception of light, flat-rolled items.

Cincinnati—Warehouses are meeting demand from stocks which are steadily being lowered because of the post-strike lag in mill shipments. Coal mine needs are expanding.

Chicago—With stocks of popular items cleaned out, warehouses are unable to fill completely many orders. Sheets, hot and cold-rolled and galvanized, move as quickly as received. Wide plates are also fast-moving and stocks of wide flange beams cannot be rebuilt because of intense demand. Bar stocks are unbalanced and generally low in all sizes, both carbon and alloy.

Birmingham — Warehouse demand is active and bids fair to remain so indefinitely. Stocks are adequate for the most part, chief shortage being in sheets followed by plates.

Los Angeles—Distributor activity continues strong. Although increased orders the past 30 days are reported in the overall market, warehousemen note tonnage per customer order has declined.

San Francisco—Distributors report some pickup in activity, but buying is not heavy. Except for sheets, supplies are balanced.

Seattle—Warehouse buying is improving. March will show a slight gain in volume over February. Prices are unchanged. Stocks are balanced.

Refractories . . .

Refractories Prices, Page 117

Chicago—The Chicago Retort & Fire Brick Co. has advanced its price on super-duty hard-fired, fire clay brick, from $135 per 1000 bricks to $141.

Plates . . .

Plate Prices, Page 113

New York—Plate sellers report improved demand for oil storage tanks. Latest coal strike has further impressed utilities and industrial companies with importance of developing an alternate source of fuel.

While operations at eastern commercial car shops drag, railroad shop activities are picking up. The latest new inquiry of importance involves 1500 cars for the Reading Co., comprising 1000 hoppers and 500 box cars. Plates also will be required for a 4-month car repair program for the Delaware, Lackawanna & Western.

Boston—Heaviest demand for plates centers in one-half and 7/16-in., large diameter pipe being fabricated by Walsh Holyoke Boiler Works, Holyoke, Mass. Four contracts, approximating $1.5 million, include one for 3700 tons, 48-in., 7/16-in. wall, while three total 24,000 ft, 36-in., of which 12,900 ft is one-half in. This work is for Boston Metropolitan District commission.

Philadelphia—District plate mills continue to step up production slightly, reflecting further modest increase in demand. Most can still make fairly early deliveries.

Cleveland — Plates continue to move at sluggish pace though boiler shops have been taking representative tonnage. A little tank work also is reported currently. Large tonnage business, however, lags. The market is firm though some eastern sellers have been partially absorbing freight on shipments into this area. Also, foreign plates are being offered for delivery, dock, Cleveland, at $5 per ton under domestic delivered prices.

Birmingham—There has not been a time in recent months when plate supply was abreast demand. Pressure eased about a year ago, but diversion of tonnage at Republic Steel Corp.'s Gadsden works, plus resumption of car building at Bessemer, as well as expanding general needs, tightened supply conditions considerably.

Los Angeles—Plate demand continues to ease with fabricator inventories substantial. Requirements are tapering for tank and heavy pipeline construction. Mills quote 60-day delivery.

San Francisco—Offerings of Dutch plates are being made in this area about $10 per ton under domestic prices.

Seattle — Plate fabricators note more interest due to improved weather. Fair demand for small tonnages has followed two months of poor business.

Rails, Cars . . .

Track Material Prices, Page 115

Seattle—Mexico and Japan are reported here to have reached agreement for exchange of $6,800,000 worth of sugar for equal value in steel rails. First sugar cargo has left Vera Cruz for Yokohama and

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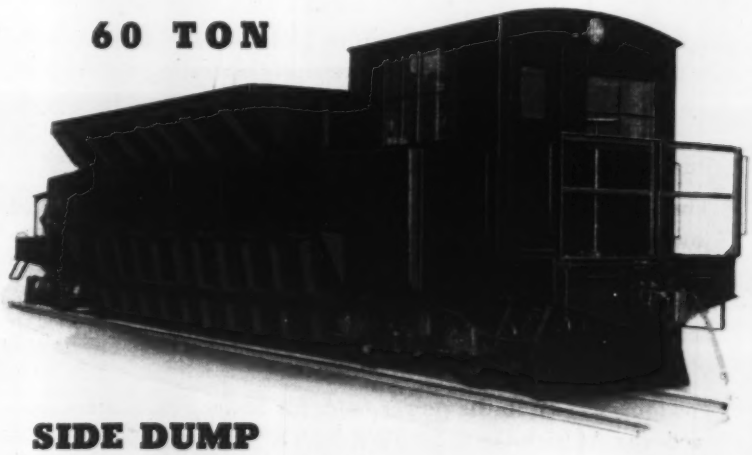

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the first shipment of rails from the Yawata steel mills is expected in April. The deal was between Scott & English and Naigai Export Co., Tokyo.

Steel Bars . . .

Bar Prices, Page 113

Boston — Normal allotments of semifinished steel are again going to finishing mills with carbon bar deliveries somewhat more extended. More tonnage is scheduled into June, including small rounds and flats, also bessemer stock.

New York—Deliveries on orders for hot carbon bars are extended around seven to eight weeks. On special, free machining grades deliveries extend 10 to 12 weeks. Situation reflects somewhat more diversified demand. Hot alloy bars can be had in four to five weeks.

Pittsburgh—Output of carbon steel bars under 3-in. has been added to products on quota by Carnegie-Illinois Steel Corp. Demand for these sizes has been particularly heavy and there are no indications requirements from automotive, appliance and other major consumers will decline significantly in second quarter.

Philadelphia — Operations at district shops producing small forgings are creeping up, now averaging close to 60 per cent. Producers of large forgings report little activity. There is some aircraft work, but railroad requirements continue light and work is negligible.

Cleveland — Steel bar deliveries have been further extended as result of production lost during the coal strike, but pressure for shipments is not out of the ordinary. Supply conditions in this market are described as moderately tight. They are not comparable in any respect with conditions in the flat-rolled products. Producers are comfortably booked into second quarter but they can still accept tonnage for delivery in that period. In fact, one mill can give late April-early May delivery on hot rolled bars.

Chicago—Consumers find no bar grades or sizes are available for nearby delivery from district producers. Progressive easing in supply is expected as inventories are rebuilt but better delivery is not expected for several months.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 113

Cleveland—Seasonal expansion in demand for reinforcing bars is being experienced. Numerous small jobs are being let and substantial increase in inquiry is reported. Much pending work involves public projects, including schools, hospitals, street improvement and sewer construction jobs. Bids were taken last week by Canton, O., on 1500 tons of bars for sewer work. Some price shading is reported and competition is being encountered from foreign steel. Belgian and German reinforcing material is reported being offered in

this market at prices up to $5 per ton delivered under local delivered prices on domestic bars.

San Francisco—Spring expansion in roadbuilding is expected to bring heavier movement of reinforcing bars shortly. Some pickup in commercial and industrial building is getting under way.

Seattle—Rolling mills here are on reduced schedules but inquiry for reinforcing bars is active. Second quarter is expected to develop a heavy volume. Bethlehem Pacific Coast Steel Corp. will furnish 250 tons for an appartment at Ketchikan, Alaska.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 116

Pittsburgh — Unusually heavy demand is noted for oven foundry coke. Consumers are attempting to biuld stockpiles. The Neville Island price for oven foundry coke is unchanged at $20 but there are prospects of a $1 advance around Apr. 1. Some Connellsville beehive furnace and foundry coke is moving below the range of $14 to $14.50 and $15.50 to $16.50 per net ton, respectively, but bulk of tonnage is being sold within published price ranges. Wise County beehive foundry and furnace coke have advanced 60 cents per net ton to $15.95 for foundry and $15.20 for furnace grades. New River county beehive foundry coke was increased $1 to $19.

New York—Oven coke prices are unchanged. Coal prices are tending upward, but until they become stabilized there likely will be no advance in the coke market here.

Cincinnati—Shipments of coke have started from ovens recently out of production. Prices are unchanged here though tonnage from the Indianapolis ovens is higher.

Semifinished Steel . . .

Semifinished Prices, Page 113

Pittsburgh—Nonintegrated producers of plain hot-rolled pickled and galvanized sheets report sharply increased semifinished steel costs. One interest says semifinished in the form of sheet bars, strip or plate breakdown ranges from $60 to $75 per net ton. Because of the wide fluctuation in the price of sheet bars, and also because of the uncertainty as to length of demand for products of hand mills, some sellers insist that customers furnish the sheet bars. This procedure substantially reduces expenditures in operation of hand mill facilities and eliminates risk of being caught with substantial high priced sheet bar stocks. To obtain a firm price commitment three months ahead on sheet bars, a nonintegrated mill must agree to a cancellation clause which penalizes the buyer $20 a ton for unshipped tonnage.

Youngstown — Steelmaking operations in this district are back to 100 per cent of ingot capacity for the first time since late in January. Seventy open hearths now are in opera-

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Columbia Steel Company, San Francisco, Pacific Coast Distributors
Tennessee Coal, Iron & Railroad Company, Birmingham, Southern Distributors
United States Steel Export Company, New York
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tion in the area. Republic Steel Corp. started up its bessemer converter plant idle since Feb. 10. While the plant was down, the bessemer blooming mill drive was changed from steam to electric power.

Scrap . . .

Scrap Prices, Page 120

Pittsburgh — Stronger market on open-hearth grades is verified by large tonnage purchase by a major mill of No. 1 heavy melting at $32 and at $29 for No. 2 grade. Brokers have paid as high as $32 for No. 1 heavy melting, which normally would indicate a mill purchase at $32.50 or more. This is not the case, however, on basis of representative tonnage mill orders even in those isolated instances involving electric furnace scrap for eventual production of sheet bars for further reduction into premium priced sheets on non-integrated hand mills. Purchases of low phos are noted within range of $34.50 to $36, up about $1 per ton. Increased activity is developing among captive foundries. Railroad heavy melting market also is somewhat stronger with mill purchase at $33.50 recorded.

New York—Brokers buying prices for No. 1 heavy melting are unchanged at $21.50-$22, f.o.b. shipping point, but are higher on No. 2 heavy melting and No. 1 busheling at $18-$18.50.

Boston—Scrap is slightly more active with higher end of the price range more frequently paid for heavy melting steel, namely $20.50 and $17.50 for No. 2. Lighter grades are unchanged. Cast grades are slow, most consumers being out of the market while some are holding up shipments against orders.

Cancellation of commodity rate of $1.72 gross ton on scrap shipments, Hartford to Bridgeport, in lots of 700 tons from one consignor to one consignee, permitting a rate of $1.80 is sought by railroads.

Philadelphia — Steel scrap buying is active. No. 1 heavy melting and No. 1 bundles have been purchased at $25, delivered, and No. 2 heavy melting and No. 1 busheling at $23. No. 2 bundles are now $19.50-$20, machine shop turnings $18, short shovel turnings $19.50. Mixed borings and turnings are $17, reflecting an increase in blast furnace requirements.

Low phos punchings and plate scrap, electric furnace grade, are up to $28-$29 delivered. Electric furnace bundles are higher at $26.50 and heavy turnings at $25. Knuckles and couplers, and steel car wheels are stronger at $30. No. 1 cupola is moving in modest quantities at $31-$33 delivered while other cast grades are strong but unchanged.

Buffalo — Underlying strength is apparent in the scrap market despite continuation of the stalemate in steelmaking grades. Prices of cast advanced $1 a ton on a moderate sale of cupola at $31.50-32.50.

Cleveland—Stronger undertone prevails in the scrap market but little new buying is being done by the mills. Movement of tonnage on old orders is substantial. Foundry demand for cast grades is described as fair. For the moment prices are unchanged and no definite trend is expected to develop until next month when it is believed the mills may re-enter the market for good-sized tonnage. Resumption of practically all idled blast furnaces following the coal strike is seen in some trade circles as indicating the steelmakers will use more hot metal over coming months with resulting depressing effect on scrap.

Cincinnati—Prices are unchanged. District dealers and brokers are not agreed on the near trend, but a degree of strength is traced to reflection from other districts. Most activity is on old contracts and spotty, light buying.

Birmingham—Demand for scrap is improving, especially for open-hearth grades. Dealers and brokers anticipate better tonnage flow with warmer weather and somewhat higher prices, especially on both open-hearth and cast material.

St. Louis—Mills are buying moderately at price levels prevailing the last few weeks. But brokers are pressing for markups on melting steel and some railroad items. They are confident negotiations under way will

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result in higher levels in the next 30 days. Shipments to dealers continue light.

Los Angeles—Dealers report mill rejections have increased, indicating plant stock piles are substantial. Prices are steady.

San Francisco—Demand is below normal but prices are unchanged. Dealers are over-supplied in most instances. Mills are buying only sufficient quantities to replenish stockpiles.

Seattle—Mills are buying scrap as needed. Supplies of better grades are ample for current consumption. Prices are unchanged.

Chicago—Prices for major open-hearth grades are firmly established on higher ground with purchase by two major mills of No. 1 heavy melting at $29, No. 2 at $27, No. 1 bundles at $29 and No. 2 bundles at $25. No. 1 railroad heavy melting is now $30-$30.50. Electric furnace bundles have risen to $28-$29 and cut structurals are bringing $30-$30.50. Railroad malleable is $39-$40. Recent purchases are expected to take one mill out of the market through April; the other until mid-May.

Pig Iron . . .

Pig Iron Prices, Page 112

New York—Some producers drew considerably on stocks during the coal crisis, but iron is now available in a greater variety of grades. In general there is sufficient tonnage to meet needs of district consumers.

Most gray iron foundries in this area are operating three to four days a week. Nevertheless, there is a better feeling.

Boston—Demand for pig iron has improved slightly. March production by the Everett furnace will move in full to consumers and some tonnage may be required from stock. Mild winter has enabled users at tidewater to maintain water shipments. One plant took but four cars by rail. Close to 1000 tons of Austrian iron is offered around $42 ton port.

Philadelphia—The Alan Wood Steel Co. is blowing in the smaller of its two blast furnaces at Swedeland, Pa., down since early last month. It will be devoted to foundry iron and possibly some malleable. Strike was averted recently at a large district pipe mill and for the first time in a number of weeks there are no important labor disturbances at local iron consuming plants. This has tended to step up the specifications.

Pittsburgh — Gray iron foundries are stepping up production to meet increased demands. Most jobbing shops are operating only three days weekly, but increased activity is noted among captive foundries serving appliance, railroad and enamelware industries. Pig iron output is near record levels.

Cleveland—Production of pig iron in this immediate district is now back to 100 per cent of capacity. Republic Steel Corp. last week put on its fifth blast furnace here, a stack which had been idle since

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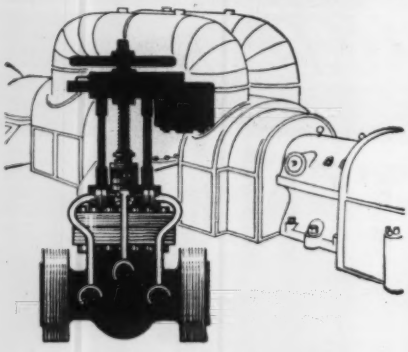

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Demand for merchant iron on contracts is reported active with foundries specifying in somewhat larger volume as result of a recent pick-up in casting orders.

Buffalo—District pig iron operations spurted 12½ points to 87½ per cent of capacity as two more furnaces were added to the active list. Hanna Furnace had its third stack on merchant iron while Republic Steel placed its Troy, N. Y. unit in operation. Falling off in demand from heating equipment manufacturers is reported.

Chicago—Inland Steel has relighted its relined No. 2 stack at Indiana Harbor, the unit to make malleable iron at the outset. Addition of this unit to the active list gives the district 36 stacks in blast out of a total of 42.

Birmingham — Pig iron demand holds above production. Output of merchant furnaces is at capacity. Iron sellers anticipate good business for the next few months.

Youngstown — Twenty-one of 25 blast furnaces in this district now are in operation. Sharon Steel Corp. last week started up a stack at its Farrell Works.

Cincinnati—Pig iron specifications show an uptrend. Shipments are meeting demands. Melters disclose no intent to pile iron in anticipation of possible price advances.

St. Louis—District blast furnaces and coke ovens have returned to capacity operations. Consumers are pinched for supplies. All are getting sufficient iron for the present, however. Post-strike demand has held up well. Some consumers that curtailed last fall are resuming full operations. The East St. Louis plant of American Steel Foundries, virtually closed for six months, is reported due to reopen April 1.

Tubular Goods . . .

Tubular Goods Prices, Page 116

Pittsburgh—Demand for standard pipe for jobber account is easing. Most distributors' inventories are inadequate for current needs. Order backlogs for oil country goods extend well into 1950 for large diameter line pipe. Oil well casing, drill pipe, etc., are in active demand. Cold drawn mechanical and pressure tubing deliveries extend six to eight weeks, more in some instances, in contrast to three to six weeks' delivery for hot-rolled classifications. There is less demand for boiler tubing than for mechanical tubing, the trend accentuated by expanding dieselization of railroads. A Yoder mill and a new electric weld pipe mill are now in operation at the Etna plant of Spang Chalfant Division of National Supply, and National Tube Co., McKeesport, Pa., respectively.

Los Angeles—Public utilities activity is sustaining pipe demand. Skelp is quoted by Bethlehem for 12 to 16 weeks delivery, 3 times longer than before the coal strike. Pipe requirements for water well equipment are expected to pick up seasonally.

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Iron Ore . . .

Iron Ore Prices, Page 117

Cleveland — Effects of the coal-strike curtailment on blast furnace operations are reflected in February data on iron ore consumption.

Use of iron ore in the month totaled 5,329,000 gross tons, according to the Lake Superior Iron Ore Association. This was a decline compared with consumption of 6,740,047 tons in January. In February, 1949, consumption amounted to 6,992,425 tons.

Consumption of ore in the first two months this year totaled 12,069,047 tons. This was a decline of 2,513,849 tons compared with use of 14,582,896 tons in the like period of last year.

Lake shippers are getting ready for a big shipping season. Expectations are 80 million tons will be shipped from the head of the lakes in the 1950 season, second largest peacetime year in history.

Ore shipping is expected to get under way early next month. Heavy ice conditions on the upper lakes prevent an earlier opening.

At the beginning of March there were 25,916,854 tons of ore on lower lake docks and at furnaces in the U. S. This compares with 30,978,994 tons on Feb. 1 and with 23,711,774 on Mar. 1 a year ago.

There were 111 blast furnaces active in the United States on Mar. 1 compared with 157 a month earlier and 178 a year ago. The 72 idle stacks at the beginning of March were expected to be in operation by Apr. 1.

Fasteners . . .

Pittsburgh—Some improvement in demand for fasteners is noted, producers generally operating five days weekly, although not all production facilities are on full time. Competition is keen in stove bolts, with varying discounts quoted, ranging from 63 per cent off to 57.5-10-15-10 and 10. Early last month some producers advanced machine screws and nuts. In most instances standard fastener classifications are available from stock, with special grades and shapes extended three to four weeks.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5000 tons, engine plant, Parma, O., for Ford Motor Co. to Bethlehem Steel Co.

975 tons, 8-story apartment, Sedgwick and Norman Avenues, Bronx, New York, to Grand Iron Works Inc., that city.

700 tons, McKinley Manor apartments, Fairbanks, Alaska, (previously reported 400 tons) to Pacific Car & Foundry Co., Seattle.

630 tons, warehouse, General Foods Corp., New York, to International Steel Co., Evansville, Ind.

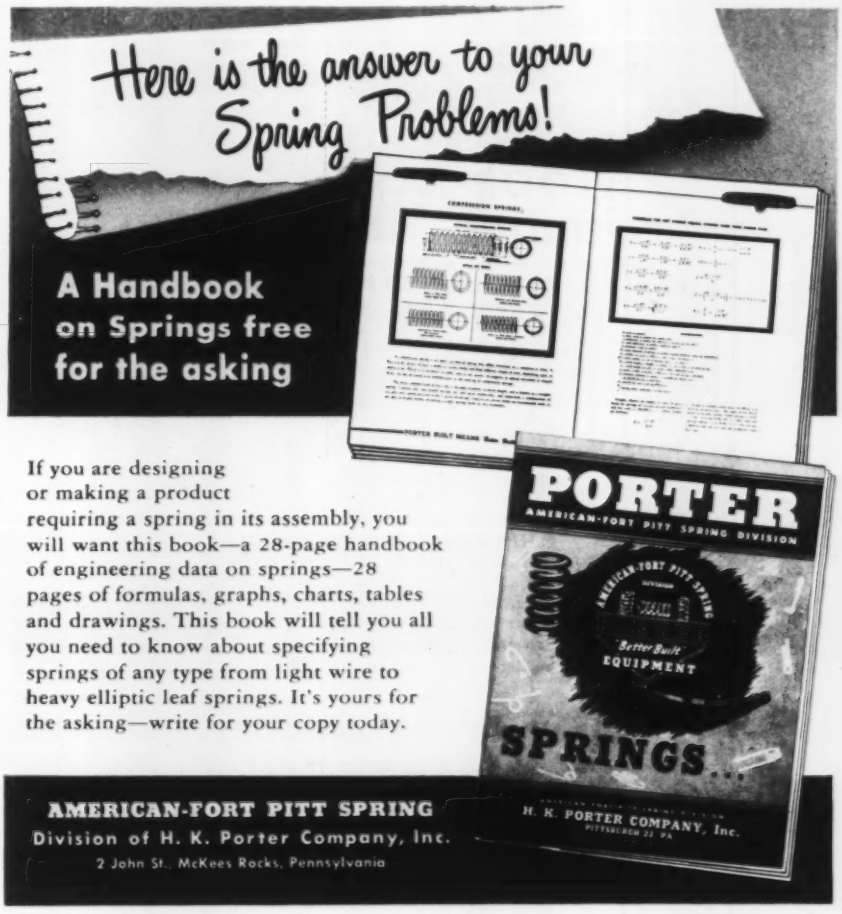
500 tons, boiler house, Parma, O., for Ford Motor Co., to Steel Construction Co., Birmingham, Ala.

335 tons, store, S. S. Kresge Co., Jamaica, New York, to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

280 tons, apartment, Sedgwick Ave. and Kingsbridge Rd., Bronx, New York, to Grand Iron Works Inc., that city.

275 tons, DuPont plant addition, Niagara Falls, N. Y., to Belmont Iron Works, Eddystone, Pa.

240 tons, Excelsior Savings Bank, West 57th St., New York, through George A. Fuller &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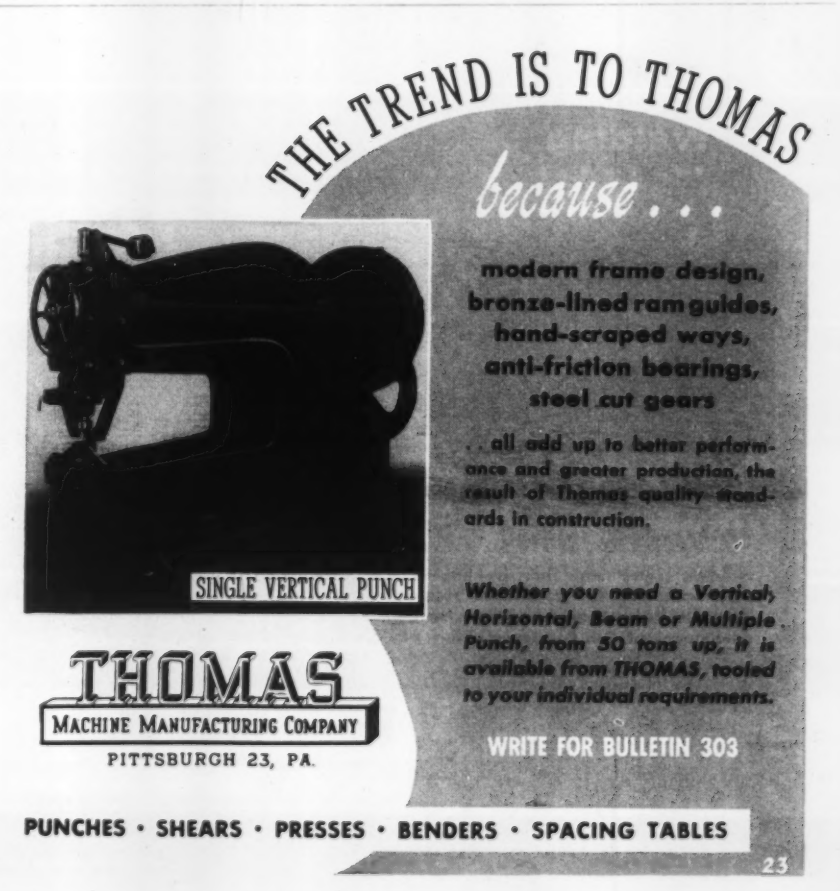
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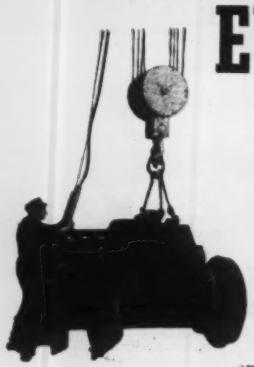

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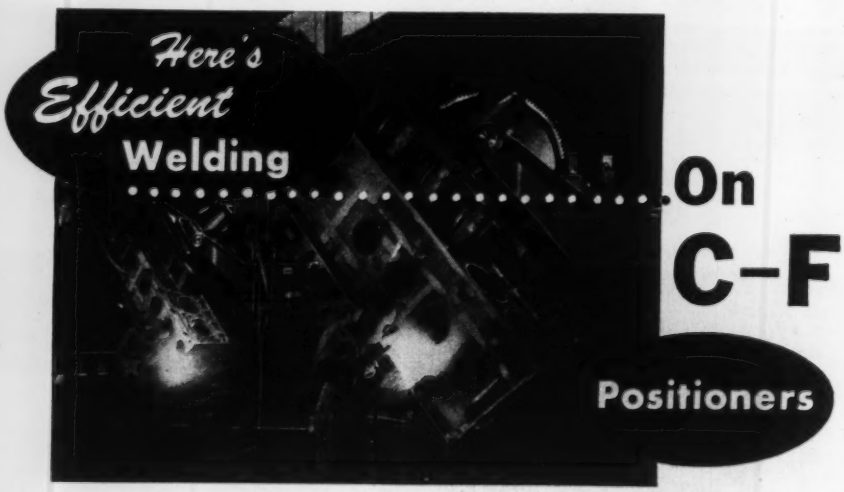

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225 tons, diesel shop, Erie Railroad, Jersey City, N. J., to Oltmer Iron Works, that city.

180 tons, Grant store, Elizabeth, N. J., to Elizabeth Iron Works, that city.

175 tons, warehouse, Atlantic & Pacific Tea Co., Hawthorne, N. J., to unnamed fabricator.

150 tons, storage building, Buckley & Co., Philadelphia, to American Iron Works, that city.

140 tons, five plate girder spans, New York Central, Rochester, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

135 tons, bridge work, New York Central, Paris, Ill., to unnamed fabricator.

100 tons, alterations, RCA building, New York, through George A. Fuller & Co., to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

100 tons, Gulkana river bridge, Alaska, to Poole, McGonigle & Dick, Portland, low, $29,624.

STRUCTURAL STEEL PENDING

6000 tons, Foster St. state bridge, Harrisburg, Pa., Booth & Flynn, Pittsburgh, general contractors, low on all three schedules.

3500 tons, state turnpike bridge, Beaver county, Pa., American Bridge Co. low bidder.

2900 tons, state turnpike, section 1 contract 3-A and section 1, contract 3-B, Salem county, New Jersey, bids Apr. 11.

535 tons, state bridge, Lawrence county, Pennsylvania, bids Apr. 14.

470 tons, ventilator buildings, Squirrel Hill state tunnel, Allegheny county, Pa., bids Apr. 14.

235 tons, state bridge, Monmouth county, New Jersey, bids Apr. 6.

155 tons, state bridge, Warren county, N. J., bids Mar. 30.

150 tons, Canyon Ferry power plant, Montana, spec. No. 2919, American Bridge Co., Pittsburgh, low $35,829.

150 tons, state bridge, Warren county, New Jersey, bids Mar. 30.

100 tons, Du Pont plant addition, Old Hickory, Tenn., bids closed Mar. 24.

Unstated, second unit joint Seattle and Washington state viaduct; plans approved, bids within 30 days.

Unstated, Project P-44, Clallam county, Washington; bids to U. S. engineer, Seattle, Mar. 29.

Unstated, 728-ft Clark Fork river bridge, also 120-ft Little Big Horn river span and 120-ft bridge Sweet Grass county; bids to highway commission, Helena, Mont., Mar. 28.

Unstated, transmitter building, Ketchikan, Alaska; Shupp Construction Co., Kodiak, Alaska, low $118,076 to U. S. engineer.

Unstated, steel frame shops, garage and power building, Glenallen, Alaska, general contract to Batchelder & Hazen, Fairbanks, low $294,260, to Alaska Road Commission.

REINFORCING BARS . . .

REINFORCING BARS PLACED

675 tons, deformed bars, Metropolitan District Commission, Hartford, Conn., to Ceco Steel Products Co., New York, $68,248.53; bids Mar. 17.

250 tons, apartment building Ketchikan, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Baldwin & Co., Seattle, general contract.

100 tons, state highway and bridge, Danvers, Mass., to Northern Steel, Inc., Medford, Mass.; C. C. Smith Co., Inc., Watertown, Mass., general contractor.

REINFORCING BARS PENDING

2500 tons, city housing development, Astoria, Queens, New York, bids asked.

1500 tons, sewage disposal work, Canton, O., bids Mar. 22.

Unstated, second unit, Seattle viaduct; bids in about 30 days.

Unstated, miscellaneous highway bridges and

other units; bids to state highway commission, Helena, Mont., Mar. 28.

Unstated, railroad overhead span and 119-ft underpass; bids to state highway commission, Boise, Idaho, Mar. 31.

Unstated, warehouse, 265 x 313 ft, for American Wholesale Grocery Co., Portland; bids in to Union Pacific railroad, Portland.

PLATES . . .

PLATES PLACED

3700 tons, 31,000 ft, 48-in., $\frac{7}{16}$th wall, electrically welded steel pipe, Blue Hills reservoir, Quincy-Milton, Mass., Boston Metropolitan District commission, to Walsh Holyoke Boiler Works, Holyoke, Mass.; M. DeMatteo Construction Co., Quincy, general contractor.

PLATES PENDING

Unstated, tanks and other facilities, Project P-44, Clallam county, Washington; bids to U. S. engineer, Seattle, Mar. 29.

Unstated, ½ million-gal. elevated steel water tank; bids to E. Penhalleck, city clerk, Moses Lake, Wash., Mar. 31.

PIPE . . .

CAST IRON PIPE PENDING

Unstated, 16,097 ft 12 to 4 in., hydrants and fittings, also alternatives; bids to Lewis E. Caldwell, city clerk, Bridgeport, Wash., Apr. 3.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Southern Pacific, 36 diesel-electric locomotives, 24 of 6000 hp each, and 12 of 1500 hp each, placed as follows: 22 of the larger to Electro Motive Division, General Motors Corp., La Grange, Ill., and the remaining two to American Locomotive Co., New York; the 12 smaller will be built by Baldwin Locomotive Works, Eddystone, Pa.

Toronto, Hamilton & Buffalo, 8 diesel-electric locomotive units, comprising four 1200-hp switchers and four 1500-hp road switchers, to General Motors Diesel of Canada Ltd.

RAILROAD CARS PLACED

Colorado Southern, 250 fifty-ton box cars, to own shops.

Ft. Worth & Denver City, 250 fifty-ton box cars to own shops.

RAILROAD CARS PENDING

New York, Susquehanna & Western, 16 passenger coaches, pending.

Reading, 1000 fifty-ton hopper cars and 500 fifty-ton box cars.

FERROALLOYS

(*Continued from Page 117*)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.) Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 20.50c per lb of contained chromium plus 11.30c per pound of contained silicon; 1" x down, bulk, 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50%

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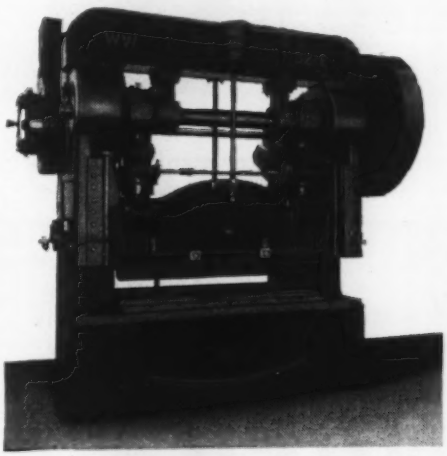

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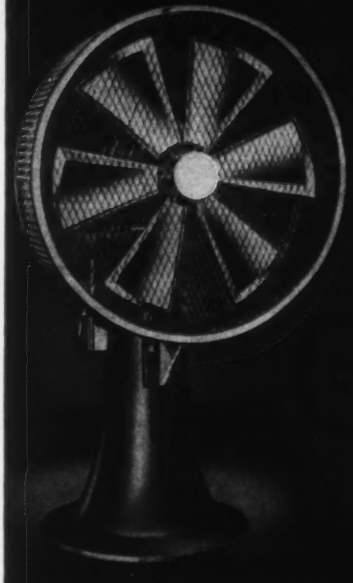

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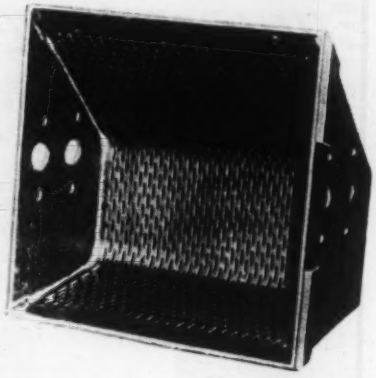

Hendrick is exceptionally well equipped to manufacture to specifications a wide range of metal products that involve such operations as perforating, shaping, forming, welding, brazing, riveting, etc. The perforated elevator bucket illustrated is typical of the many specialized articles for whose fabrication Hendrick has unusual facilities. Write us in detail regarding any metal product you desire fabricated.

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C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.
(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

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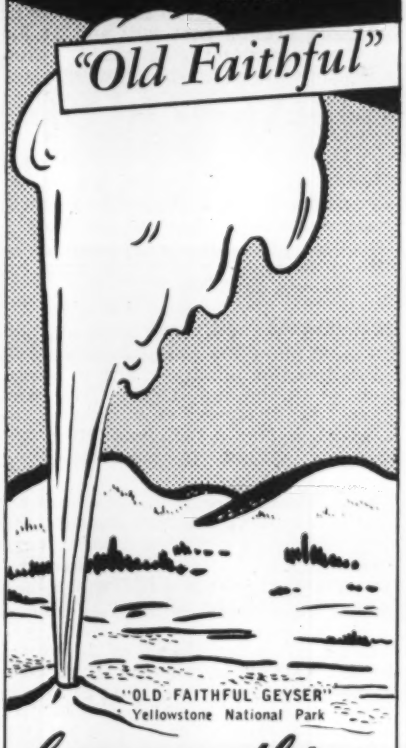

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Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.20 per lb contained V_2O_5, freight allowed Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconinum Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c F.o.b. Washington, Pa.., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $3.50 per lb of contained Cb, less ton $3.55. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min. C .30 max.) ton lots, 2" x D, $2.67 per lb. of contained Cb plus Ta, delivered; less ton lots $2.72.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7% Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

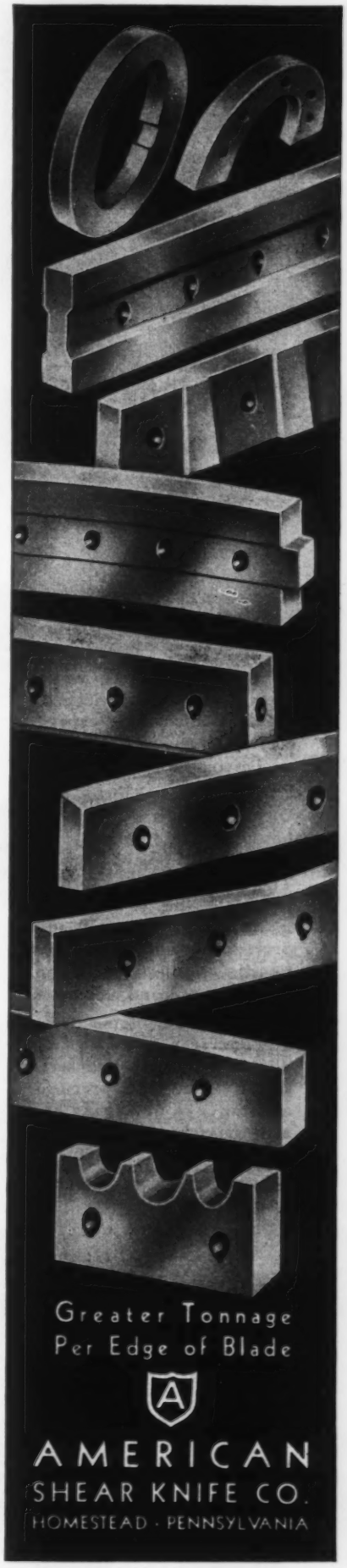
V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.



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Metalworking Briefs

CONSTRUCTION, ENTERPRISE
ORGANIZATIONAL CHANGES

Fairbanks, Morse & Co., Chicago, will construct a new $250,000 plant on W. 117th street, Cleveland. The one-story building will contain 35,000 sq ft of floor space and will house branch offices, salesrooms and a warehouse for the engine, scales and pump manufacturer.

U. S. Engineers, Tullahoma district, Tenn., is planning a substation for an air engineering development center to cost $2 million.

Federal Metal Co., Cleveland, will erect a one-story addition to its warehouse and foundry at 6621 Morgan Ave.

Sharon Steel Corp., Warren, O., parent company of Brainard Steel Co., is planning to spend substantial amounts this year and subsequently to provide new equipment. The move is being made so Sharon can convert more of its own semifinished steel.

Four marine engines now being built by **American Ship Building Co.,** Lorain, O., for two ore carriers are expected to keep the company's machine shop running at full capacity for several months, E. B. Williams, vice president, says.

Minneapolis-Honeywell Regulator Co. bought the Micro Switch Division of First Industrial Corp. at Freeport, Ill.

Will-Burt Co., Orrville, O.—coal stokers and other heating equipment—is now manufacturing Versa Vise, a fill-in product when the heating business is off season. The vise has been manufactured by a Chicago firm from which Will-Burt bought patterns, jigs, fixtures and tools.

Almco Supersheen, Albert Lea, Minn., through its enlarged engineering and development department, added a new service to solve special barrel finishing problems for manufacturers. The service also includes special research and development on automatic handling, automatic separating, hoisting, etc.

Rheem Mfg. Co., Sparrows Point, Md., is increasing its output of range, boiler and tank products by installation of additional equipment, some of which was formerly owned by **Wheeling Steel Corp.,** Wheeling, W. Va., whose boiler and tank business Rheem has recently acquired.

Ford Motor Co. is understood to have taken options on properties in Cincinnati for a parts depot that would cost about $1 million. Construction of the company's other new plant on Red Bank road is well underway, and plans for opening it are scheduled for this summer. It will be used to manufacture Ford's automatic transmission; its cost: $4 million.

Three expansion moves for **Packard Electric Division** of General Motors Corp. were announced in Warren, O. Major move is rental of the former Federal Machine & Welder Co. plant on Dana avenue. It will add 70,500 sq ft of floor space. Nearly completed is an addition to the cable plant on Dana avenue that will add 11,000 sq ft of manufacturing space. Construction will begin shortly on a plant on Thomas road where a 15,000 sq ft addition is planned.

International Paint Co. of California bought the Kelsey-Hayes Wheel Co. plant at South San Francisco and will start operations there about May 1. Purchase price for the one-story, 27,000-sq ft building and 2½ acres of ground was $125,000.

Standard Oil Co. of California announced plans for a multi-million dollar alteration of its refinery operation at Richmond, Calif. The program is designed to reduce the amount of heavy fuel production and increase output of gasoline.

Clark Metal Products, Marion, O., was incorporated to manufacture and deal in models, dies, punches, stamps, tools, jigs, etc. Thomas Clark Sr., Thomas H. Clark Jr. and Paul Schnekler are the incorporators.

George Sylvester, head of Sylvester & Co., Cleveland, reports that **Ohio Manganese Inc.** was formed in Youngstown, Ohio. Manganese Inc. will use a process developed by Sylvester for recovering manganese.

Dayton Power & Light Co., Dayton, O., announces it will spend an estimated $94,263,000 on expansion of services in southwestern Ohio; $36,936,000 of the sum will be spent in the next three years alone. K. C. Long, company president, says the program includes addition of transmission lines in all points served by DP&L as well as improvement in service.

Baltimore district offices of **American Bridge Co.** have been moved from the Mercantile building, Baltimore street, to the Federal Land Bank building, St. Paul and 24th street.

Bison Bronze Foundry Corp. was incorporated in Buffalo by Emil Szirmay, Orrin W. Bryant and Elton M. Dale.

Crest Metal Products Inc. will construct a plant in Olean, N. Y., on a new site made available by Olean Chamber of Commerce.

Colonial Radio & Television Division, Sylvania Electric Products Inc., Buffalo, plans to increase production of television sets and automobile radios, and will add about 400 additional employees in the next three months.

Betmur Steel Corp.—formerly Prain Steel Corp.—Detroit, consolidated the steel sales and warehousing operation of Progressive Steel Products Co., Detroit, with those of Betmur. All operations will be conducted under the Betmur Steel Corp. name. C.

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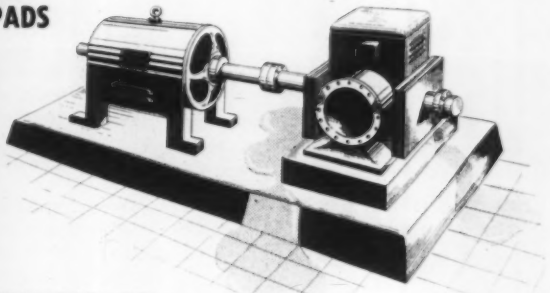
FOR CONCRETE PUMP-PADS



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Warren Garvey, former president of Progressive, was elected a director and vice president of Betmur. F. J. Westgate is president of Betmur.

Chesapeake Marine Railway Co. has acquired the former plant of **Wills-Spedeen Shipyard Inc.,** Baltimore, which it will continue in operation along with its shipbuilding and repair plant for medium and small vessels at Key Highway and Covington street.

Derby Steel Co., Baltimore, structural fabrication and ornamental iron work, plans erection of a plant addition involving approximately 10,000 sq ft.

General Welding Co., Baltimore, sold its plant to **John Hampshire Inc.,** and its equipment, trade name and good will to **Nash Welding Co. Inc.,** which has yet to establish a new location for the plant. The Hampshire company acquired the building of General Welding for investment.

Apex Bolt Products Co., Chicago, expansion bolt and pipe hanger manufacturer, named Johnson Hardware Agency, Pittsburgh, as direct factory representative for western Pennsylvania, West Virginia and eastern Ohio. Headquarters are at 35 Ewing Ave., Pittsburgh 5.

The Baltimore **Chemical & Pigment Division** of Glidden Co., Cleveland maker of titanium oxide and other paint pigments, plans to start shortly on a $2.5 million expansion program.

Continental Gin Co. Birmingham—cotton ginning machinery, materials handling, power transmission equipment and special machinery—opened a New York office to handle domestic and export activities of its Industrial Division in the East. The address is: Room 2407, 220 E. 42nd St., New York 17. A. Walter Gotta is district manager.

Thompson Co., machinery producer, is moving from its quarters at 25 Washington St., Binghamton, N. Y., to a new location at 102 South St., where it will have additional floor space.

The plant of **American Emblem Co.,** New Hartford, N. Y., strikebound for eight weeks, has been closed for an indefinite period.

Continental Can Co., New York, began moving equipment from its Warwood (Wheeling, W. Va.) plant, which will be closed down by the latter part of April. W. F. Leonhart, plant manager of the new Miflin township, Pa., Continental can factory, which is replacing the Warwood and South Wheeling plants, says the latter factory will be vacated by the end of this summer. Buildings housing the two Wheeling plants have already been sold by the company.

Mohawk Machine & Design Co., New Philadelphia, O.—coal mine cars, custom-built industrial trucks—is being incorporated by A. E. Russell, his son Harold, and Gerald R. Haney.

J. & R. Mfg. Co., Cincinnati, was organized to manufacture and deal in castings, jigs, molds, machinery and dies. Herman F. Pfeiffer, 1735 Powers St., is statutory agent. Incorporators are: F. H. Pfeiffer, Mary Barrett and Nelson Schwab Jr.

Walsh Holyoke Boiler Works Division of Continental Copper & Steel Industries Inc. was awarded four pipe line contracts amounting to about $1.5 million.

Hyster Co., Portland, Oreg., announces that Northeast Industrial Equipment Co. Inc., Cambridge, Mass., is handling sales and service of Hyster lift trucks, Straddle trucks, mobile cranes and their attachments in Maine, New Hampshire, Rhode Island and ten counties of Massachusetts.

Handy Rack for Rivets

It pays to buy the little woman flowers.

Ask E. W. Morely, warehouse superintendent of U. S. Steel Supply Co. in Los Angeles. He had been wrestling with the problem of storing 190 different sizes of Dardelet rivets in a limited space in a warehouse of the U. S. Steel Corp. subsidiary. The answer came as he was buying flowers for his wife on their wedding anniversary. In front of him he saw hundreds of varieties of flowers arranged in metal containers on a triangular shaped steel rack. Why couldn't he do the same with steel rivets?

DRUM RACK AT U. S. STEEL SUPPLY *. . . with flowers—why not with rivets?*

He did—with a steel rack 8 feet high, 23½ feet long and 11½ feet wide. Cross pieces support platforms for drum containers. Five platforms on each side contain 19 drums per line, or a total of 190 drums for the 190 sizes of rivets. Space required before the racking method was over 600 sq ft. The present method requires 270 sq ft.

Where a Standard Fastening Won't Do Use a "SPECIAL"

From time to time you may encounter bolting jobs in which the use of a standard fastening proves impracticable or uneconomical, or both. In such cases, use a "special"—a fastening specially designed and manufactured to do the particular job.

Designing and manufacturing special fastenings is itself a specialty of Bethlehem's Lebanon, Pa., plant. Our engineers at Lebanon have long experience in meeting unusual fastenings needs. After studying a bolting problem, they often come up with proposals which represent a definite improvement on the original idea.

Fastenings with hook or curved heads? . . . twisted shanks? . . . cone points? . . . We make them all, as well as hundreds of others. In fact there's hardly a type or size of special fastening that we haven't been called upon to make at one time or another. In addition to specials, of course we turn out a full line of standard bolts and nuts.

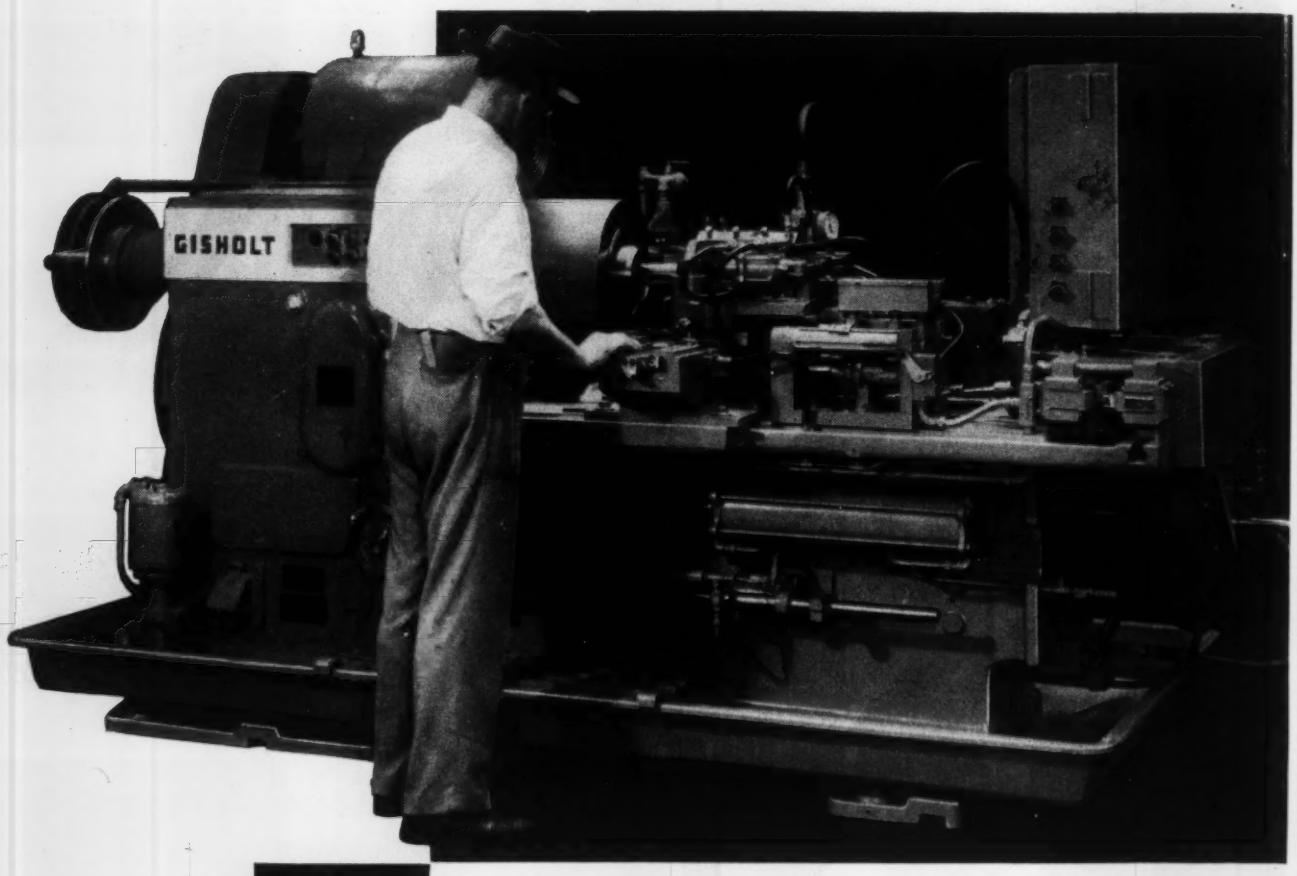
If you have a fastening problem where it looks as though a special could be used to good advantage, talk it over with us. We'll be glad to study the problem, and offer recommendations. To start the ball rolling, get in touch with the nearest Bethlehem sales office, or drop a line to us at Bethlehem, Pa.

★ BETHLEHEM STEEL ★

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Bethlehem supplies every type of Fastening



HOW 8 SIMPLIMATICS

cut machine time 50%
cut man-hours 75%

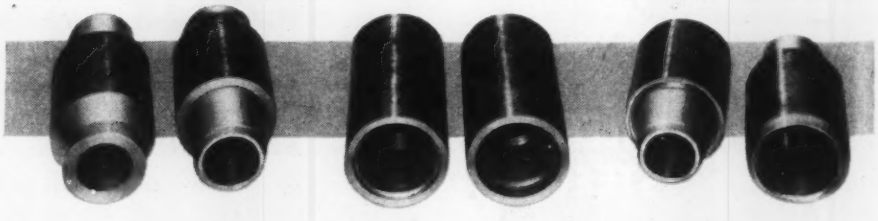
The way you can slash costs with the Gisholt Simplimatic often surprises some of the most experienced production men.

Here's a big shop which found that 8 Simplimatics could take over the job done on 16 other machines. And it takes only 4 operators instead of 16 to turn out the volume of parts required.

Not the least in the cost picture is the machine itself. For the basic Simplimatic design permits you to individualize the machine to a high degree to solve many different problems. Thus, for many jobs you can have all the advantages of a special machine merely with special tooling. Yet it's all done on a Standard Simplimatic—at far lower cost.

The importance of lower costs these days makes it important for you to get all the facts about Simplimatic Automatic Lathes.

The GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface finishing and balancing of round and partly round parts. Your problems are welcomed here.*



In producing these tool joint pins and boxes, the 8 Simplimatics work in pairs with fully automatic operation; one man can easily tend two machines.

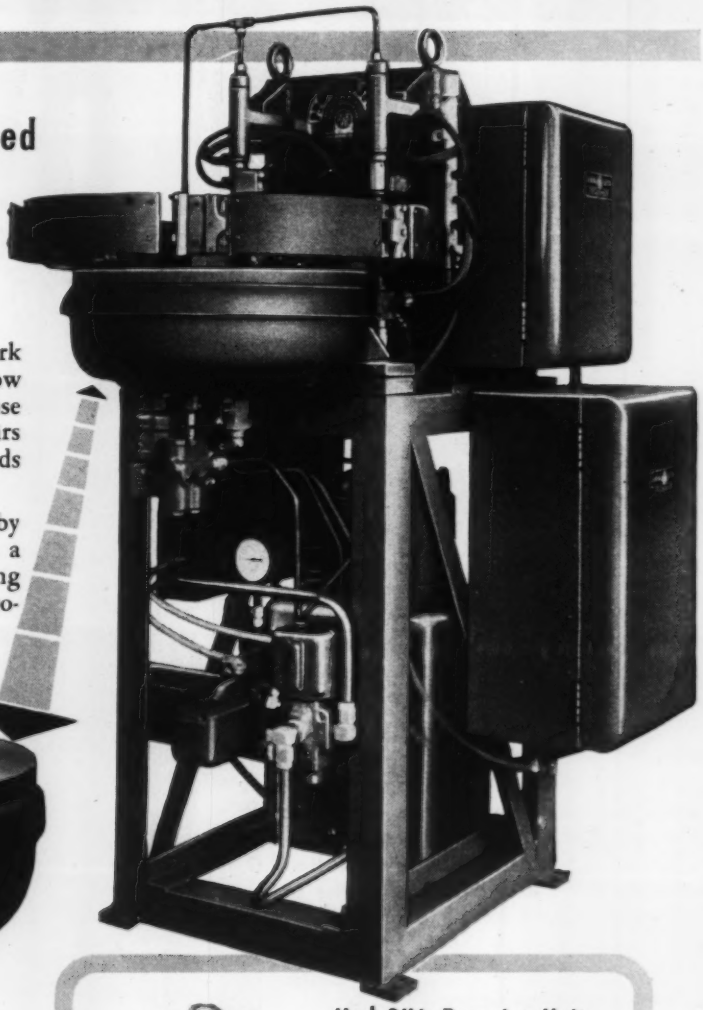
Ask about the many different arrangements possible on the Standard Simplimatics with platen table, vertical head, etc.

GISHOLT MACHINE COMPANY, *Madison 10, Wisconsin*

TURRET LATHES • AUTOMATIC LATHES • BALANCERS • SUPERFINISHERS • SPECIAL MACHINES

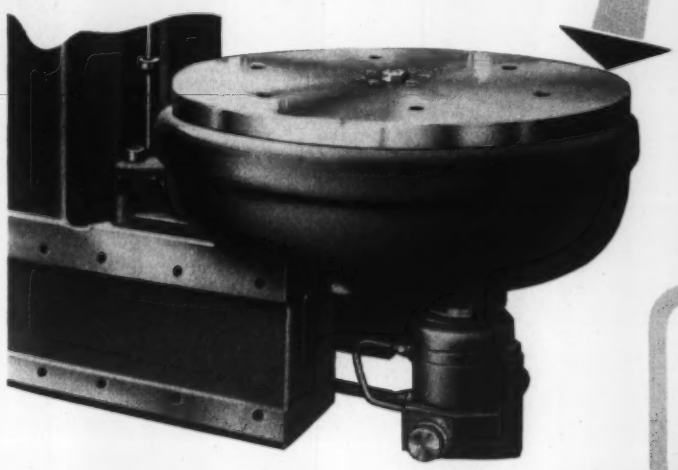
New Answer to Faster Production

Index Table Now Offers Accurate Feed For Many Types of Equipment and Many Different Operations



You get fast, automatic accuracy when you feed work to machines on Denison Indexing Tables. And now this advanced type of automatic feed is offered for use on *all types of production equipment*—backed by years of successful and often sensational results on hundreds of Denison Presses.

A good example is the welding unit at right, built by Progressive Welder Co., of Detroit. Equipped with a Denison Indexing Table, it features automatic feeding of parts to the welding guns, automatic squeeze, auto-



matic welding, automatic hold, and automatic release—in positive sequence and at controlled speeds. Each operation can be regulated individually.

The compactness of these streamlined, fully enclosed tables makes them easy to combine with other equipment. Tooling or fixtures can be evenly spaced about the dial for either 6 or 12-station indexing.

Speed of the table is regulative, and its movement is positively interlocked with operation of the equipment on which it is used. Space inside the table housing permits use of cam tracks, for automatic ejection. Possible variations in applications are almost unlimited. Please write for full details in terms of your own needs.

DENISON HydrOILics

HydrOILic Pumping Unit Powers Indexing Table

Power for the Denison Index Table is supplied by this complete and highly compact pumping unit, which can be either a part of the complete machine assembly, or can be installed separately at any point, with connective piping. Available in several models and sizes.

The DENISON Engineering Co., 1163 Dublin Rd., Columbus 16, Ohio

We would like more information on Denison Indexing Tables. We are especially interested in their possible application to:

Type of operation_____

_____

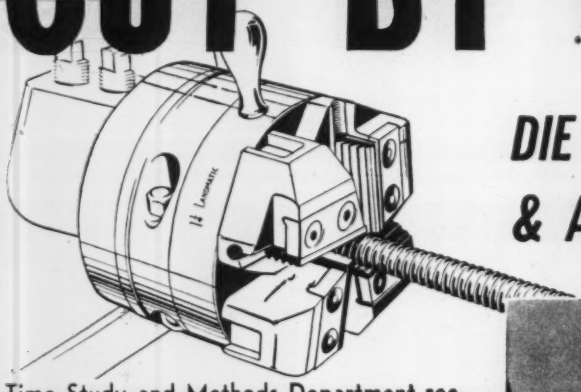
Name_____

Firm_____

Street_____

City_____ Zone____ State_____

THREADING COSTS CUT BY OVER 75%



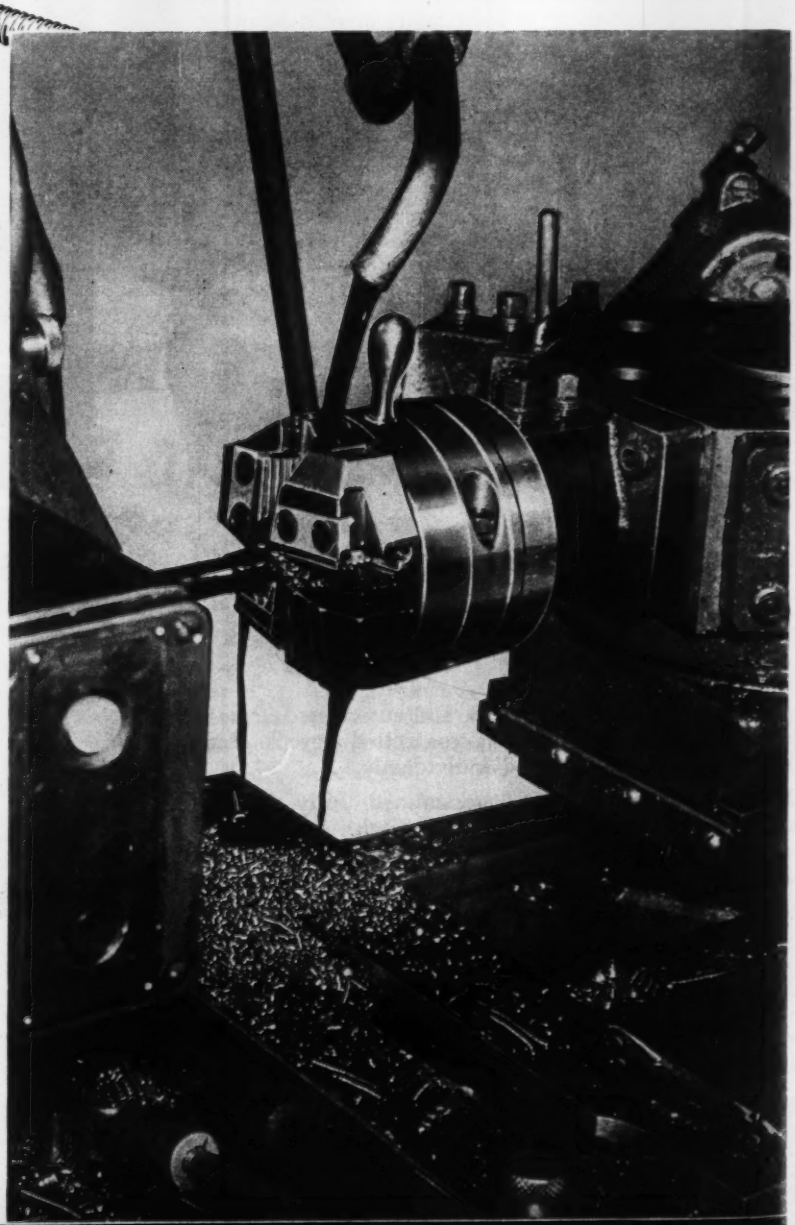
DIE HEAD CUTS COST OF PRODUCTION & ASSEMBLY OF STABILIZER SCREWS

Time Study and Methods Department records of a large aviation equipment company furnish data of still another job where LANDMATIC Heads have effected large savings in machine time and assembly and improvements in product quality.

In this operation, the 1¼" LANDMATIC Head on a turret lathe equipped with Leadscrew is cutting a ⅝-6 Acme thread on a Stabilizer Screw used by a light aircraft manufacturer. The thread was held to the close tolerance of ±.001 between the P.D. of the thread and the O.D. of the screw, for a full thread length of 5⅜" on cold-drawn piston stock, Spec. #AISI, B1112.

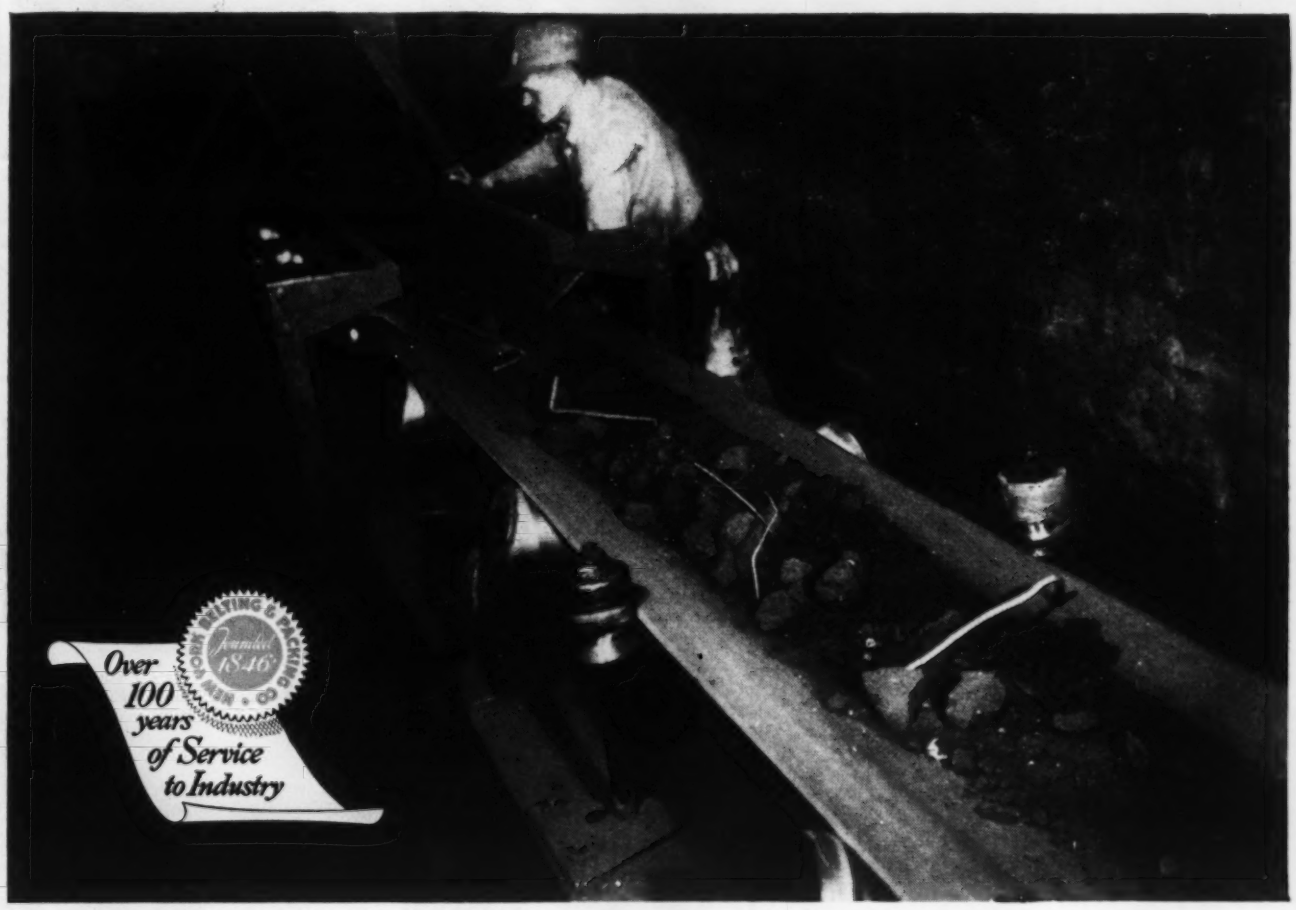
Former methods required two passes to produce the finished thread—one roughing and one finishing cut. The thread is now cut in one pass in .192 at a spindle speed of 230 R.P.M. Approximately 400 pieces are cut between chaser grinds. Hand fitting with the mating nut in assembly, previously necessary, has been eliminated. Total cost savings in all operations are in excess of 75%.

LANDMATIC Heads are stationary threading heads with self-opening action designed primarily for turret lathes. Their unusually-large oversize capacity makes them ideally suited for these machines. For detailed information and specifications, write for Bulletins F-80 and F-90.

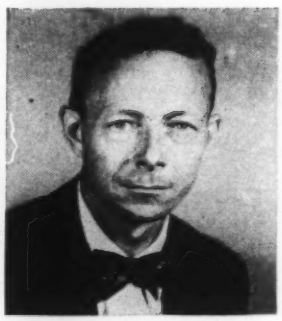


LANDIS Machine COMPANY
WAYNESBORO, PENNA.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS



THIS BELT KICKS OUT FOUNDRY GATES



Here is Mr. Eugene Brown, NYB&P Distributor, who has a customer whose conveyor belt was being torn and gouged by razor-sharp foundry gates.

Mr. Brown* solved the problem by specifying the NYB&P belt shown above, for this shake-out service. Within the structure of this belt, special segments have been built that kick out destructive gates before they get a chance to do serious damage. It has a tough, heat-resistant cover and is flexible enough to trough easily, thereby allowing for maximum loads.

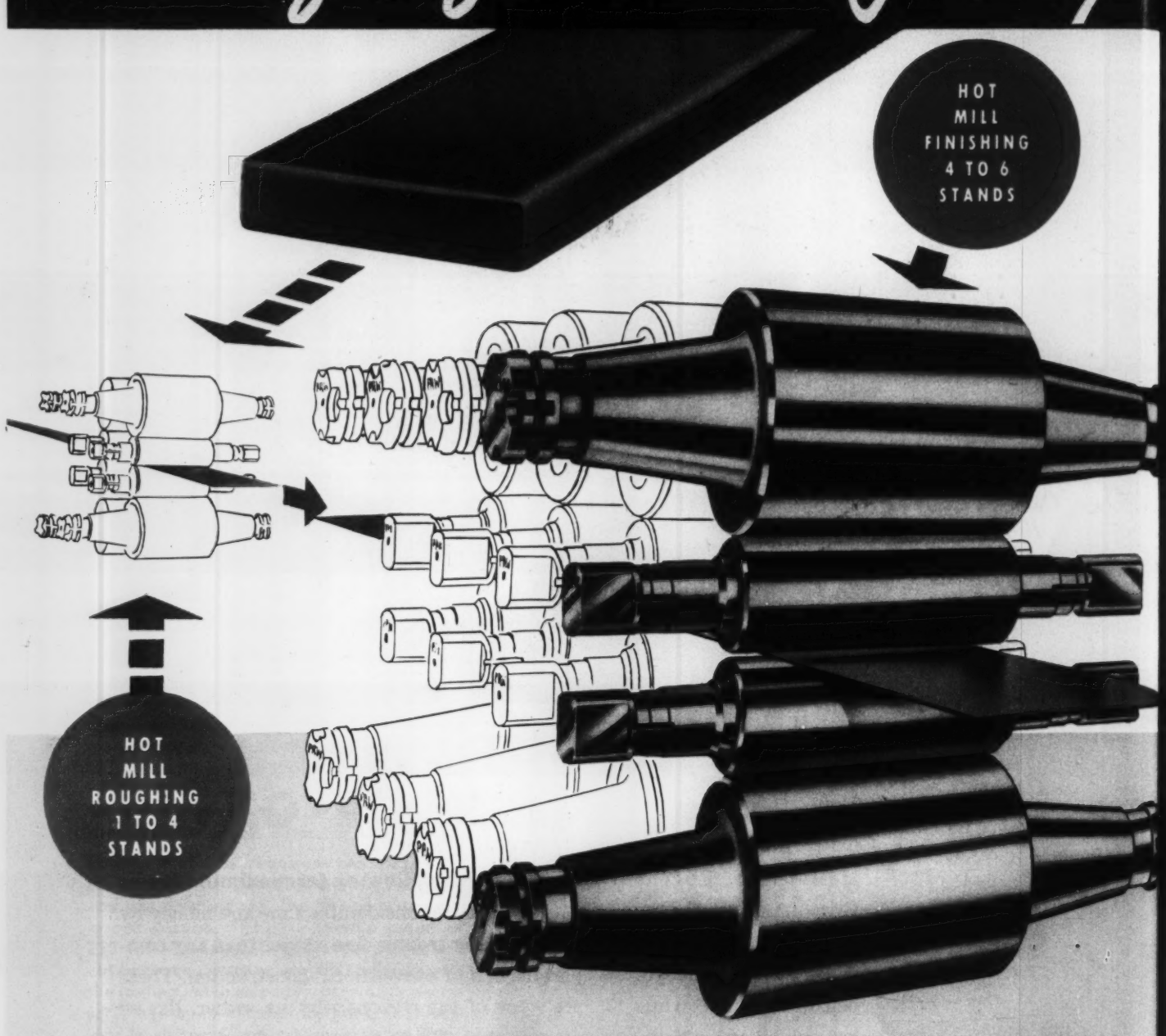
It saves users considerable time and money by giving greater trouble-free service than any comparable belt of conventional construction. These are some of the reasons why its owner, like so many other NYB&P users, refused to order any other brand.

Whenever you have a problem involving mechanical rubber goods, consult your NYB&P Distributor. Rely on his help and practical advice. His reputation has been built on his ability to keep production lines moving and to supply you with the right item at the right time.

**Brown Engineering Co., Reading, Pennsylvania.*

NEW YORK BELTING & PACKING COMPANY
1 MARKET STREET, PASSAIC, NEW JERSEY

Technique for Rolling Strip

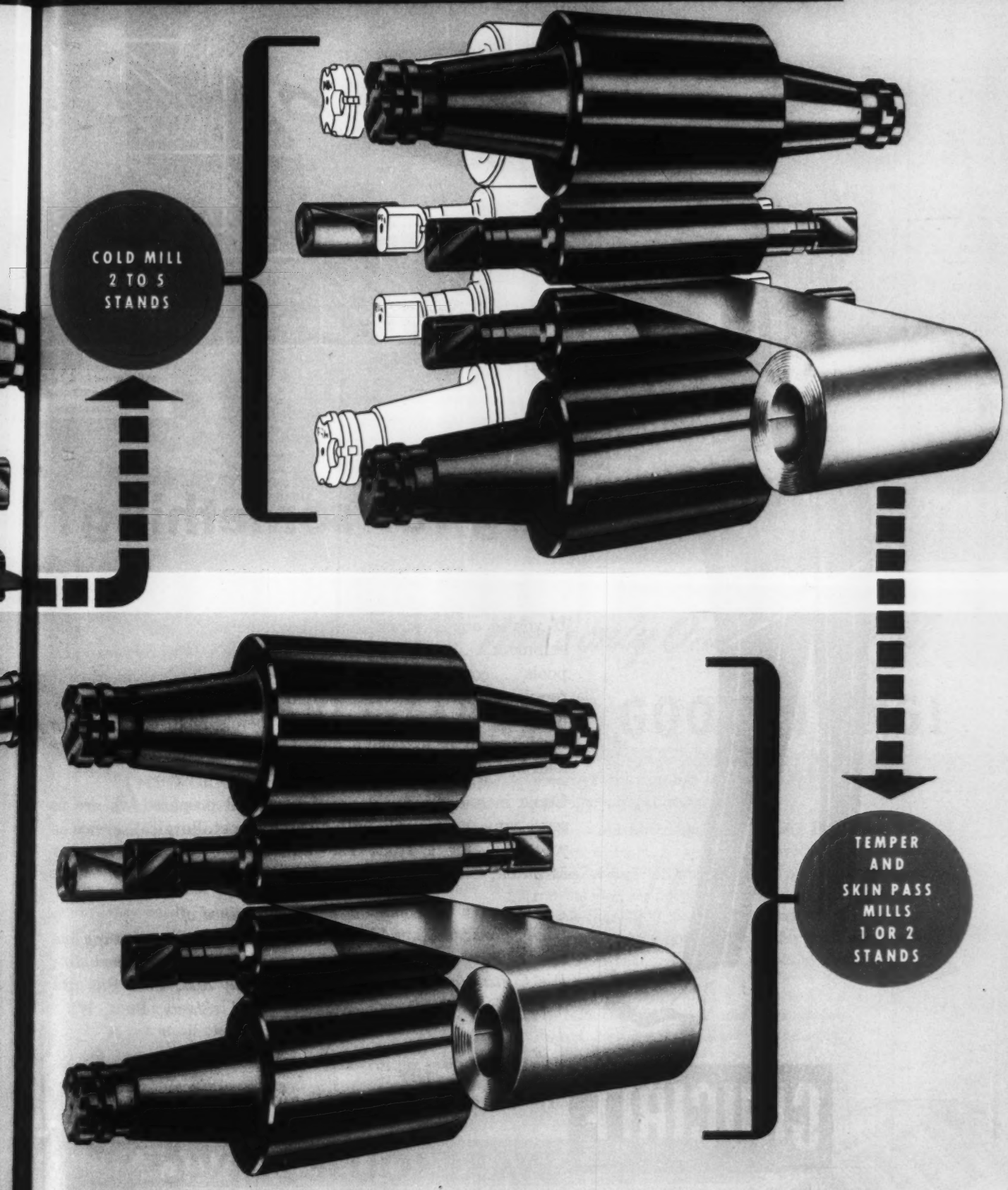


Pittsburgh Grade alloy iron work rolls and Phoenix "A" alloy steel back-up rolls in four high strip mills produce highest tonnages at *less cost per ton of steel rolled.*

PITTSBURGH

Hot and Cold...

P.R.W.



ROLLS

DIVISION OF BLAW-KNOX CO.

PITTSBURGH 1, PENNSYLVANIA

looking for something?

If you're out of stock, don't need, or can't wait for a mill shipment, . . . take advantage of Crucible's 23 warehouses and pools . . . completely stocked with specialty steels to meet your requirements. Immediate shipments make your inventory planning easier, and that means there's no need to tie up needed cash in extensive inventory. Let Crucible carry the load by making our stocks your warehouse.

Come in and see for yourself how well prepared we are to serve you . . . not only with steel, but metallurgical service as well. Ask for a stock list. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, New York.

Complete stocks maintained of
High Speed Steel . . . AISI Alloy, Machinery, Onyx Spring and Special Purpose Steels . . . ALL grades of Tool Steel (including Die Casting and Plastic Die Steel, Drill Rod, Tool Bits and Hollow Drill Steel) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes)

CRUCIBLE first name in special purpose steels

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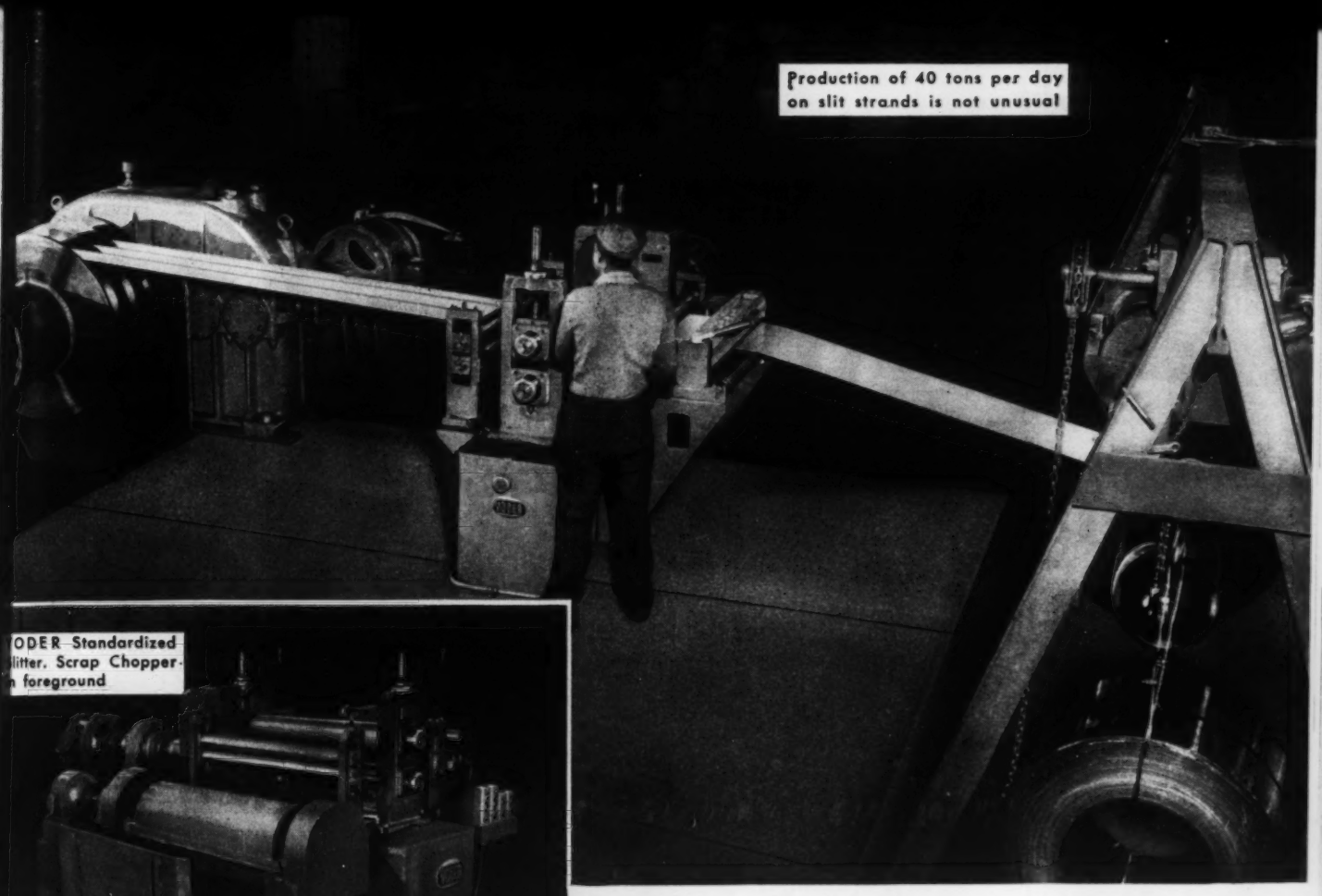
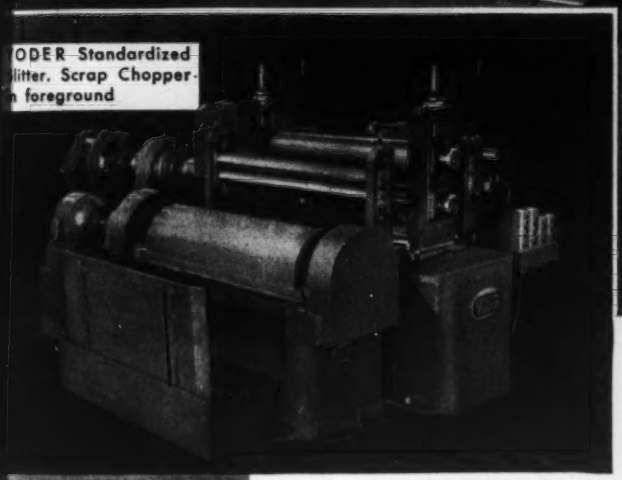


Production of 40 tons per day on slit strands is not unusual



ODER Standardized litter. Scrap Chopper- n foreground

Works only One Day a Week

. . . YET EARNS A GOOD LIVING!

ANY WORKMAN who could do that—well, maybe there never was such a man, but there certainly is such a machine — the Yoder Rotary Gang Slitter for coils and sheets.

Figure it out for yourself and you will see how it may easily "earn its keep" and pay for itself in jig time, on less than 20% operation. With an experienced crew of two or three, a daily production from 20 to 140 tons is possible. With just a medium size Yoder slitting line and average size coils, forty tons per day is not at all unusual.

At the prevailing rate of one-half cent per pound for slitting service, not counting size extras, this would mean yearly earnings of about $20,800.00 working only one day per week.

Yoder standardized series of slitting line units (uncoilers, slitters, scrap choppers, recoilers) offer the greatest values for your money — in capacity, output, convenience, accuracy, and stamina. If you use, handle or sell over 1000 tons of sheet and strip per year, a Yoder slitter may not only be highly profitable, but a great convenience besides. For special needs, slitting lines built to order.

Consultations, Estimates and Recommendations. 76-page Slitter Book for the asking.

THE YODER COMPANY
5502 Walworth Ave. • Cleveland 2, Ohio

Complete Production Lines

- ★ **COLD-ROLL-FORMING and auxiliary machinery**
- ★ **GANG SLITTING LINES for Coils and Sheets**
- ★ **PIPE and TUBE MILLS—cold forming and welding**

ENGINEERING YODER MANUFACTURING

FORGINGS BY FINKL

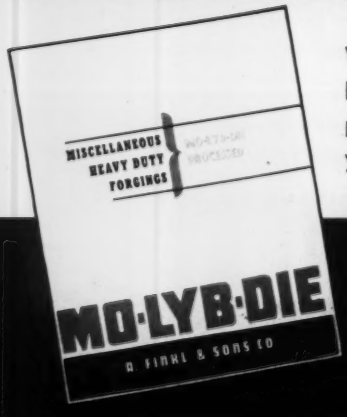
MANUFACTURERS OF THE LARGEST FORGINGS IN THE MIDDLE WEST

One of two 15 ton helical gear blanks in various stages of production: after forging and iso-thermal treatment; lowering into water quench; rough machined after complete metallurgical inspection and approval.

Finkl developed Nickel-Chrome-Moly forgings out-perform ordinary commercial alloy types by a wide margin, are of comparable cost, and decidedly more economical when their longer service is considered. They have the strength, stamina, and fatigue resistance needed to withstand the severe stresses of modern production schedules.

Forging, heat treating, and machining operations are accomplished with skill, experience, and the most modern equipment. Forgings of carbon, alloy, and stainless steels ranging from a few pounds to 50,000 pounds apiece are within the scope of the Finkl Organization.

Write or phone us when you are ready to talk forgings. Finkl Sales Engineers are always at your service.



Write for the 16 page free booklet on "Heavy Duty Forgings". Profusely illustrated, it shows forgings of all sizes in every phase of development from ingot to finished product. Send your name, company name, address, and your position.

A. Finkl & Sons Co.

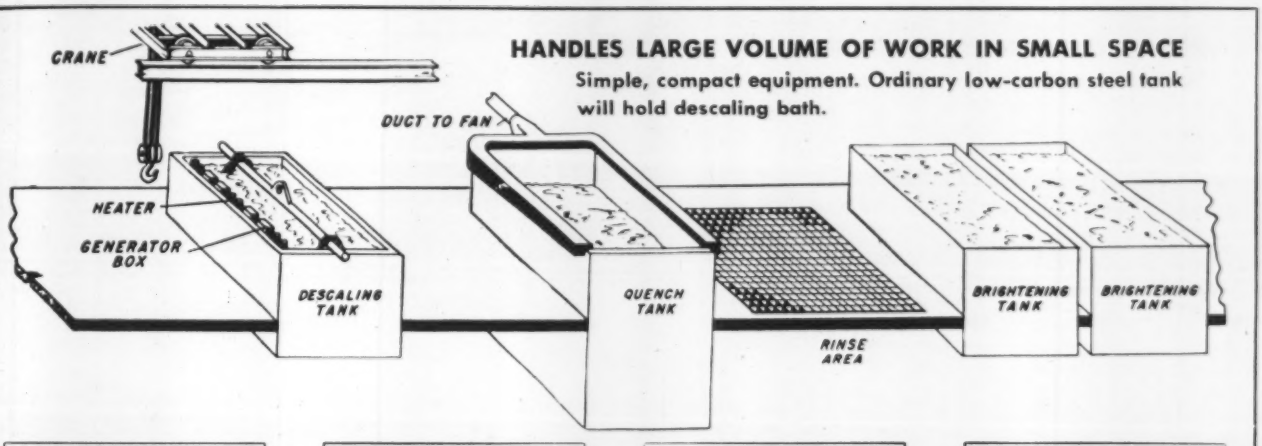
2011 SOUTHPORT AVENUE · CHICAGO 14

DIE BLOCKS AND INSERTS • PISTON RODS AND RAMS • SOW BLOCKS • CRANKSHAFTS

YOU CAN CLEAN WORK OF ANY SIZE

easily, quickly, economically

with the Du Pont Sodium Hydride Descaling Process



HANDLES LARGE VOLUME OF WORK IN SMALL SPACE

Simple, compact equipment. Ordinary low-carbon steel tank will hold descaling bath.

BATH

Sodium hydride reduces the scale quickly without pitting or loss of base metal. Action stops as soon as scale is reduced.

QUENCH

Steam generated by the hot work blasts off most of the loosened scale.

RINSE

High-pressure water rinse leaves work ready for inspection, galvanizing, machining, etc. Also removes smut remaining after brightening.

BRIGHT DIP

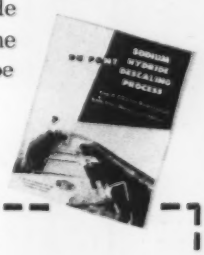
(Optional)

Diluted acid gives bright surfaces when required. After rinsing, work is finished or ready for further processing.

REMOVE SCALE quickly and completely from a wide variety of metals, alloys, and bimetallics—in any size or shape—with this modern descaling method.

HANDLE DIFFERENT METALS in the same operation . . . alloy steels, stainless steels, nickel, cobalt, copper, chrome . . . any work not affected by the carrier bath of fused caustic at 700° F. Installations now in operation are descaling all types of finished articles and processed stock, ranging from small parts weighing only a fraction of an ounce to huge stainless sheets over 3 tons in weight.

FOR COMPLETE INFORMATION on a process that can mean important savings in metal, time, space, equipment, materials, and the disposal of waste products—mail the coupon below. It will bring you promptly a copy of "Du Pont Sodium Hydride Descaling Process," which describes the process and tells how easily it can be installed and used.



Tune in Du Pont "Cavalcade of America" Tuesday nights—NBC coast to coast

DU PONT

Sodium hydride process for positive descaling

DUPONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Department
Wilmington 98, Delaware

Please send my copy of "Du Pont Sodium Hydride Descaling Process."

*Name*_____

*Firm*_____

*Position*_____

*Address*_____

COLD FINISHED BAR
Automatic Screw Stock

YOUNGSTOWN Cold Finished Carbon and Alloy Steel Bars are now being produced in a wide range of sizes and shapes, supplied either in coils or straight lengths.

Drawn to meet standard specifications, these bars have the characteristics that make them ideal for high-speed screw machine operations--uniformity of composition, toughness and strength, close tolerances in dimension, and smoothness and brightness of finish.

You'll find a Youngstown bar stock to meet almost any requirements. Tell our representative what you want and we will make every effort to serve you at once.

QUALITY · YOUNGSTOWN · SERVICE

Youngstown
COLD FINISHED CARBON AND ALLOY STEEL BARS

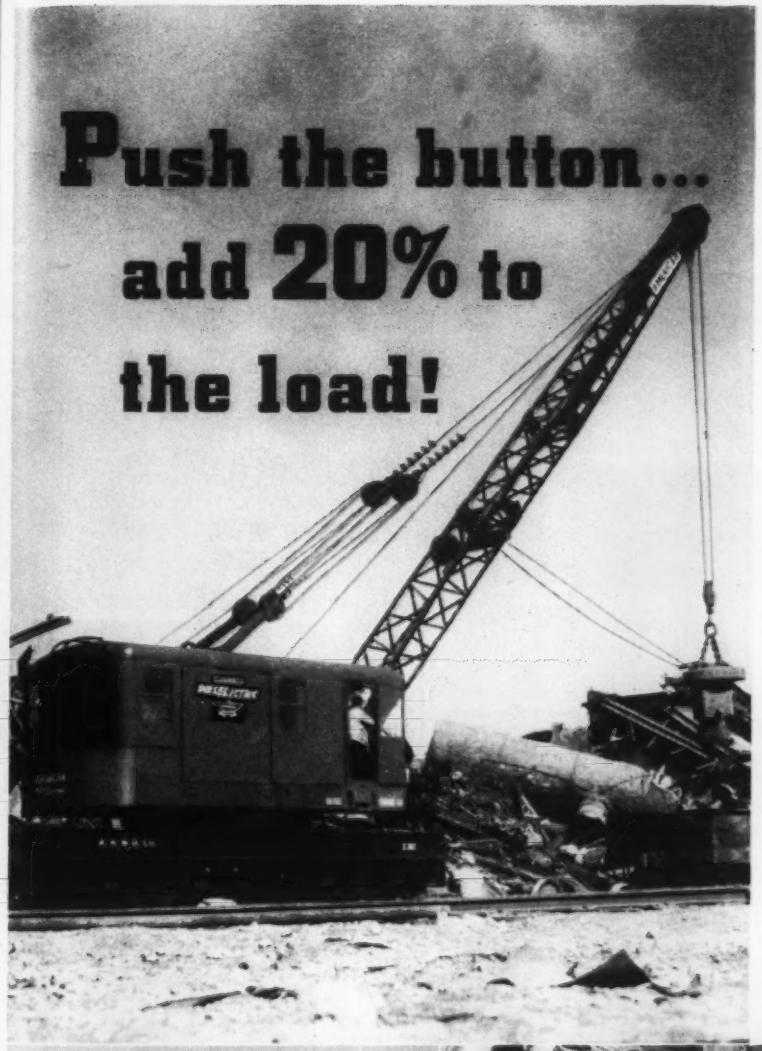
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices — Youngstown 1, Ohio

Export Office - 500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - TIE PLATES AND SPIKES - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS.

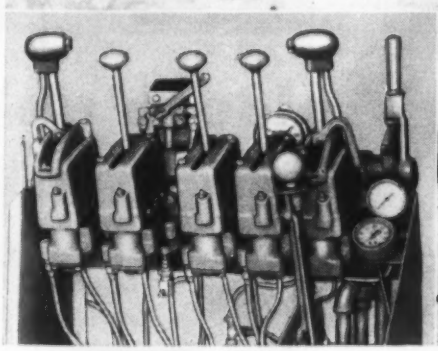


Side by side, two locomotive cranes loaded scrap at one of the big steel mills. Each made exactly the same number of passes with the same size magnet. Then the scrap was weighed . . . and the new American crane had moved 20% more material, by weight, than an older crane of the same rated capacity.

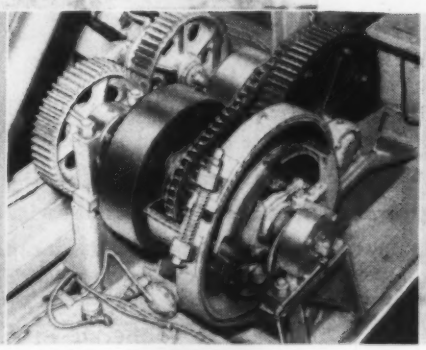
The difference? *Over-excitation* . . . an instantaneous extra shot of power to the magnet, which then lifts and holds with the same force as though magnet size were increased by 20%!

This great feature is yours on any American Locomotive Crane —all capacities. Your choice of power—including the great new DiesELectric. Want more facts? Mail the coupon for illustrated catalog.

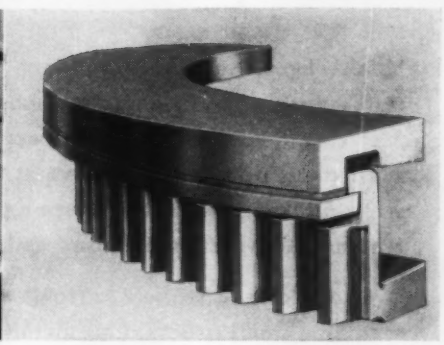
★ Diesel-Electric Locomotive Crane Patent No. 2083460. Touch Control Patent No. 2370856.



Push Button Controls...
On hoist and slewing levers, make easy, effortless magnet work. For over-excitation, just hold pick-up button an instant. To unload, push the other button. No need to ever take hands off main control levers.



Patented Boom Hoist
Maximum flexibility due to ability to raise or lower boom while hoisting, swinging or traveling. Boom can be raised from maximum to minimum radius in less than a minute. Photo shows unit with gear cover removed.



Interlocking Gib Ring
has done away with weak, unstable center king pin on all American cranes. Eliminates rocking, teetering, tipping. Distributes weight of machinery and load on a fully-enclosed 9-foot roller bearing.

American Hoist
& DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2: SO. KEARNY, N.J.
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19
American Hoist & Derrick Company
St. Paul 1, Minnesota 9501

● Please send catalog on American Locomotive Crane.

Capacity _____ tons. Type of work: _____

Name _____

Company _____

Address _____

City _____ Zone ____ State _____

CLOSE TOLERANCE IS A "MUST" FOR
WISSCO SPECIALTY WIRES....

You'll agree that holding wire to a tolerance of one ten-thousandth of an inch and furnishing such wire commercially in a size as fine as .003, calls for extremely accurate dies and skilled craftsmanship. And, while we at Wickwire make all kinds of steel wire, our reputation is built upon this and other types of specialty wires that must have high, uniform quality, perfect surface and close tolerance.

You don't have to be a carload user of wire to get special attention. We welcome small orders. Our metallurgists are ready to cooperate in the solution of any wire problem. Our mills can meet the most exacting specifications. And our growing volume of repeat orders is evidence of satisfactory service.

If you want steel wire of any size, temper, analysis or finish, send your order to Wickwire Spencer. We'd like to add your name to our list of satisfied customers.

WISSCO *Wire*

A PRODUCT OF WICKWIRE SPENCER STEEL DIVISION · THE COLORADO FUEL AND IRON CORPORATION

WIRE SALES OFFICE—361 DELAWARE AVE., BUFFALO 2, N. Y.

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SALES OFFICES—BOSTON · CHICAGO · DENVER · DETROIT · NEW YORK · PHILADELPHIA

PACIFIC COAST SUBSIDIARY—THE CALIFORNIA WIRE CLOTH CORP., OAKLAND 6, CAL.

CF&I

SUPERLA Soluble Oil

Gets double-barreled saving in piston grinding

The Job: Cylindrical grinding of cast-iron automotive pistons.

Machines: Six Norton Grinders.

Aiming at higher production and economy, a midwest plant tried various soluble oils on the job described above. Of the products tried, SUPERLA Soluble Oil proved superior to any and helped this plant reach its goal through these benefits:

Fewer wheel dressings—70 to 80 pistons are produced before wheels need dressing, as compared with an average of 30 to 40 pistons obtained with other soluble oils. This amounts to a big saving through reduced time and labor for dressing wheels.

Greater production—Less interruption for wheel maintenance adds approximately 40 minutes to the daily production time of each machine.

These additional advantages of using SUPERLA Soluble Oil are reported by the shop foreman: piston diameters kept within a tolerance of .0005 to .001 inch, no rusting troubles, no soluble-oil rancidity or odor troubles.

The experience of this plant indicates the savings you can make with SUPERLA Soluble Oil, not only on cast-iron jobs but on a wide variety of operations. Such product benefits, moreover, are multiplied by Standard Oil's engineering service which puts at your immediate disposal the help of an experienced lubrication specialist. How you as a midwest manufacturer can profit by this product-service combination is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

Whether your problem is one of obtaining greater production or higher product quality, there's a Standard Oil lubricant or cutting oil that can help you reach that goal. Moreover, there's a Standard Oil man who will work right with you until that goal is attained. This man is one in the corps of Standard Oil lubrication and cutting oil specialists throughout the Midwest. You'll find him at the nearest Standard Oil Company (Indiana) office. His experience and special training will help you get maximum benefits from such outstanding products as:

STANICUT Cutting Oils—These special-duty cutting oils meet today's most exacting requirements and highest production schedules. Grades varying in viscosity are available, each containing the correct proportion of extreme-pressure and anti-weld ingredients.

STANOSTAMPS—Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical application. STANOSTAMPS offer maximum protection for dies and work, can be readily removed in conventional washing equipment.

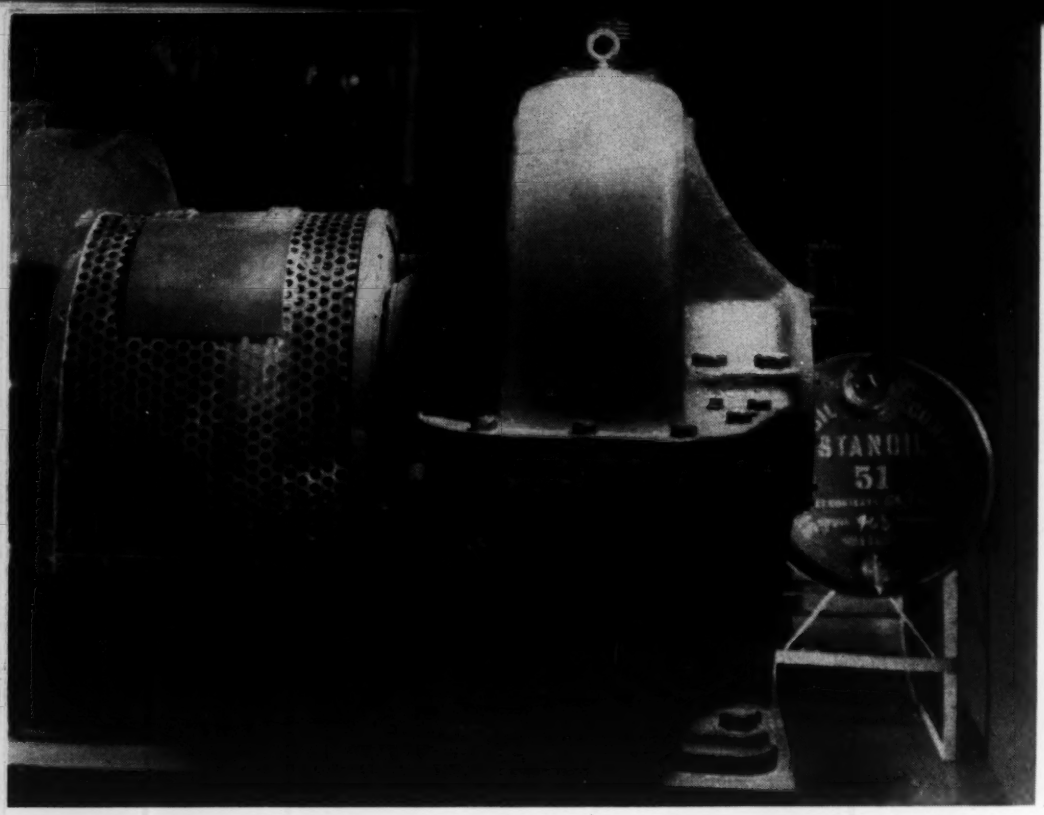
STANDARD Quenching Oil—From Standard Oil's complete line of quenching oils, this product is recommended for general quenching work in systems provided with suitable cooling arrangements. It is a light-bodied oil of pale color that offers high quenching speed and minimum deterioration in continuous use.

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA Greases—Available in lime soap and soda soap types, SUPERLA Greases cover a wide range of applications. These products are comparable in quality to the highest type of special greases but are as readily available and economical as ordinary cup greases.

STANDARD OIL COMPANY (INDIANA)

STANDARD



Arrest the dirty work in reduction gears

THE dirty work starts in reduction gears when the lubricating oil begins to oxidize and break down under the attack of heat and air. Oxidation products, uniting with dust and other foreign matter, form deposits which interfere with proper lubrication and cause gear wear.

STANOIL
TRADE MARK
Industrial Oil

You can head off this dirty work—avoid costly cleaning jobs, oil changes, and gear wear—by using STANOIL Industrial Oil. The high stability of STANOIL prevents deterioration by heat. Its low-carbon-forming base oil keeps gears free from carbon. An inhibitor curbs acidity growth which would cause the formation of emulsions and sludge.

The many qualities of this one oil enable it to handle a wide variety of jobs in your plant. To assure you maximum benefits from STANOIL and other high-quality petroleum products, the Standard Oil Company has a well-trained and experienced lubrication specialist located practically at your doorstep. How you can profit by this unique product-service combination is explained at the right.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

• To help you solve particular lubrication problems or gain greater all-around economy, Standard Oil has set up an industrial service that's unrivalled in the Midwest. This service puts at your immediate disposal the help of a highly trained, experienced lubrication specialist and a reliable supply of petroleum products. All you need do is phone or address a card to the nearest Standard Oil Company (Indiana) office. In fact, why not start right now by arranging for the visit of the lubrication specialist assigned to your plant. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Hydraulic systems . . . cleaner operation, no foaming troubles.

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings . . . rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs

STANDARD

STANDARD OIL COMPANY (INDIAN

P&H helps you

cut fabricating costs on "hard-to-weld" steels ·

Have superior physical qualities — ideal for welding heavy sections that must withstand severe shock and abuse.

Low-Hydrogen Electrodes

- ***For problem steels:*** High carbon, high sulphur, cold-rolled, alloy . . . *70LA.*
- ***For steel castings repair;*** matches analysis and heat-treating properties of Grade B castings . . . *P&H25C.*
- ***For welding nickel-alloy steels;*** gives high impact resistance at low temperatures . . . *75LP.*
- ***For chrome-moly steels*** (1% Cr., ½% Mo.) used in power piping . . . *80LE.*
- ***For chrome-moly steels*** (2% Cr., 1% Mo.) used in power piping . . . *90LE.*
- ***To match heat-treating properties of SAE 1040*** and like steels. Also for steel-castings repair . . . *P&H40C.*
- ***For welding high hardenable steels.*** Also steel castings repair . . . *AW2B.*
- ***For repair welding Grade C castings*** and steels of similar composition . . . *P&H#7.*
- ***Comparable to SAE 8630 steel***...excellent heat-treating and flame-hardening characteristics . . . *90LH#2.*
- ***For welding high hardenable steels*** without preheat such as re-rolled rail stock . . . *P&H#12.*
- ***For aircraft and similar steels . . .*** has wide range of properties under heat treatments . . . *P&H#21.*

Withstand high amperages and have high deposition rate. Operators burn more rod per hour, weld faster at lower costs.

These rods operate with stable arc on AC or reverse-polarity DC. Other money-saving features are: Elimination of underbead cracking. Low hydrogen content for successful enameling. Little or no preheating. Minimum spatter. Excellent appearance of weld . . . freedom from surface holes. Order from your P&H representative or local P&H distributor. Send coupon for detailed information.

P&H WELDING DIVISION
Milwaukee 14, Wis.
HARNISCHFEGER CORPORATION

HARNISCHFEGER CORPORATION, Welding Division
4411 W. National Ave., Milwaukee 14, Wis.

Please send me complete information on money-saving P&H Low-Hydrogen Electrodes.

Name.....

Company..... Title.....

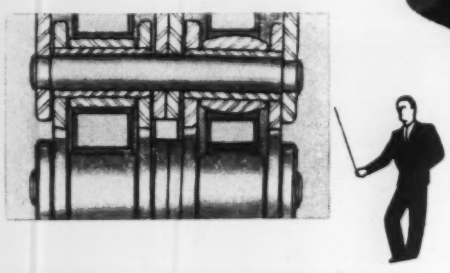
Address..... Home ☐ Business ☐

City..... (.....) State.....

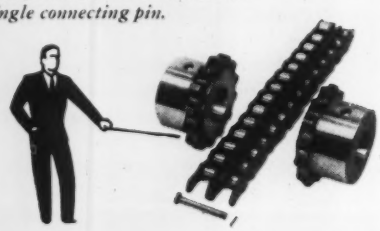
EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZER • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

this Coupling gives you *True flexibility* without backlash!

1. *True flexibility...maximum shock-absorbing ability because pins bend.*



2. *Easily installed or disconnected with single connecting pin.*



3. *All-steel. No short-lived material.*

● Baldwin-Rex Tru-Flex Couplings give you true flexibility without destructive backlash. These efficient chain couplings with their exclusive convex rollers on one chain strand give you better all-round performance . . . more protection for your machines . . . longer service. Here's why:

The convex rollers maintain only line contact with sprocket teeth and because of this contact, pins are designed to flex or bend. The flexing of the pin, plus the inherent flexibility of roller chains, accommodates misalignment, allows end play, and absorbs greater torsional shock loads. Too, this design permits the chain to be fitted snugly around the sprockets as contrasted to the "sloppy fits" of ordinary chain couplings. This, plus the fact that no short-lived materials are needed to give flexibility, makes it easy to see why Tru-Flex Couplings will give you longer, more efficient service.

For all the facts on Tru-Flex Couplings . . . how their single pin construction makes installation and disconnecting easy without an axial shift of either shaft . . . how they dampen pulsating loads . . . and their many other features, send for your copy of Bulletin No. 48-6. Address Baldwin-Duckworth Division of Chain Belt Company, 326 Plainfield Street, Springfield 2, Mass.

BALDWIN·REX

ROLLER CHAIN COUPLINGS

Consistently Uniform

- Sharp, Tough Corners
- Straight, True Sides
- Clean, Strong Threads

REPUBLIC UPSON

Semi-finished and Cold Punched Nuts!

—from the more than 20,000 members of the REPUBLIC UPSON Quality Line.

★

REPUBLIC STEEL CORPORATION
Bolt & Nut Division
CLEVELAND, OHIO • GADSDEN, ALABAMA
Export Department: Chrysler Building, New York 17, N.Y.

REPUBLIC STEEL ®

Republic UPSON

BOLTS AND NUTS

96 YEARS FASHIONING THE FASTENING HABITS OF INDUSTRY

The famous U·S·S

UNITED STATES STEEL CORPORATION, 436 Seventh Ave., Pittsburgh 30, Pa. Subsidiaries: AMERICAN BRIDGE COMPANY • AMERICAN STEEL & WIRE COMPANY and CYCLONE
NATIONAL TUBE COMPANY • OIL WELL SUPPLY COMPANY • TENNESSEE COAL, IRON & RAILROAD COMPANY • UNION SUPPLY COMPANY • UNITED STATES STEEL

Here's added sales appeal for your steel products at NO EXTRA COST!

Label on the products you make will help you sell more of them, more easily

WHEN your product gets to market, a little thing like a well-known label can make it stand head and shoulders above competitive products. The U·S·S Label, for example, is a silent symbol of quality to your customers—the retailers. And it's a silent symbol of quality to *their* customers—the ultimate buyers. To these people, the U·S·S Label is a sure guarantee that your product is made from good steel.

You can use the U·S·S Label on your product, no matter what kind of U·S·S Steel you use. It can be sheets, strip, tubing or wire. Carbon, stainless, alloy, high-strength or copper steel.

The Label is backed by a strong, consistent advertising campaign that reaches thousands of retailers. This same campaign reaches millions of their customers. These people are reading about the label in their favorite magazines. They're hearing about it via the famous Theatre Guild on the Air radio program. They *accept* the U·S·S Label as their assurance of quality steel.

Take advantage of the overwhelming public confidence in U·S·S Steels. Write on your letterhead for full information about the simple plan that will give added sales appeal to the steel products you make. United States Steel Corporation, P.O. Box 236, Pittsburgh, Pa.

UNITED STATES STEEL

USS

NEGIE-ILLINOIS STEEL CORPORATION • COLUMBIA STEEL COMPANY • CONSOLIDATED WESTERN STEEL CORPORATION • GERRARD STEEL STRAPPING COMPANY
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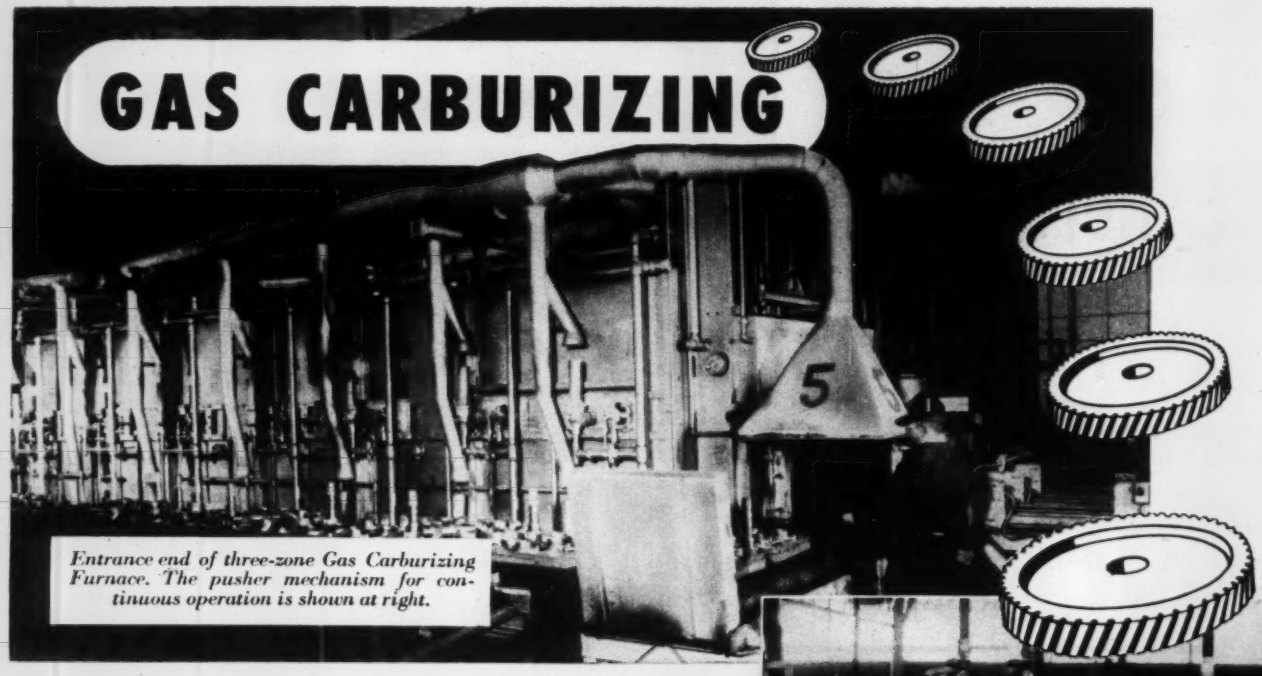
GAS CARBURIZING



Entrance end of three-zone Gas Carburizing Furnace. The pusher mechanism for continuous operation is shown at right.

Multiple Uses of GAS for Heat Treating at SPICER MANUFACTURING

DIVISION OF DANA CORPORATION

Emphasizes Versatility of GAS for Metalworking

INCREASED PRODUCTION of case hardened precision gears and pinions is obtained from these GAS heated furnaces. Two-zone furnaces, manually operated, carburize ring and side gears, pinions and pinion mates. Four-zone furnaces automatically carburize and quench shafts and gears for heavy-duty transmissions and torque converters.

Parts are carburized in these controlled atmosphere furnaces, which utilize GAS radiant tube heating. With GAS heating, the accurate control of temperature permits uniform case hardening day after day, with warp and distortion held to a minimum. This precise production control is vital since most of the heat-treated heavy-duty gears are used without further grinding.

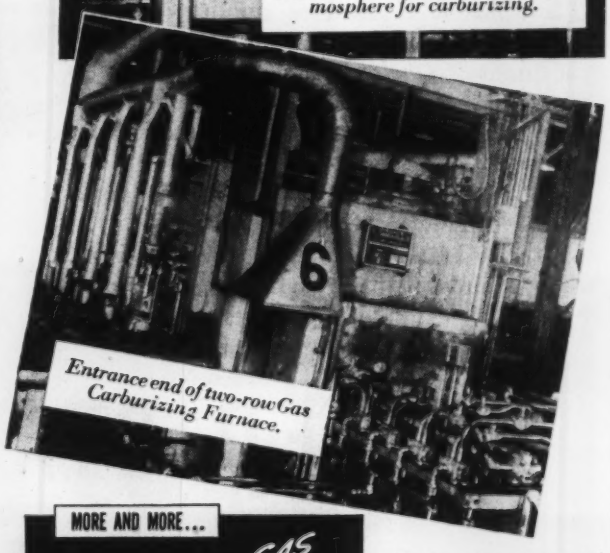
	OPERATING DATA				Capacity	
	Zone 1	Zone 2	Zone 3	Zone 4	lb/hr	Cycle
2-zone furnace	1700°F	1650°F	.....	.....	660 net	7 hr
	Continuous pusher type with fan circulation of gas					
4-zone furnace	1725°F heat	1725°F Carburize	1150°F Cool	1550°F Reheat	920 net	10 hr 48 min

These carburizing furnaces provide another example of the versatility of GAS for metal treating with characteristic results:

- **Increased Production Rate**
- **Superior Grain Structure in 8620 or 4320 gear teeth**
- **Uniform case depth and carbon concentration with continuous operation**
- **Consistent low rejection loss due to warp and distortion**

The heat treating methods at Spicer Mfg. Division, Toledo, demonstrate some of the ways in which GAS can be applied in manufacturing precision parts. Your Gas Company Representative is ready to show you how to make effective use of GAS in *your* heat-treating applications. Call him today.

RX Gas Generators which supply correct carbon content atmosphere for carburizing.



Entrance end of two-row Gas Carburizing Furnace.

MORE AND MORE...

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

Photographs — courtesy of Surface Combustion Corporation, Toledo, Ohio, Manufacturers of Industrial Gas Furnaces.

AMERICAN GAS ASSOCIATION

420 LEXINGTON AVE., NEW YORK 17, N.Y.

Type F350 Safety Goggles made by Willson Products, Inc., Reading, Pa. Plastic tubing removed from one cable temple to show relationship of component metal parts—all made of Anaconda Nickel Silver.

EYE PROTECTION... *with Eye-Appeal*

When a functionally efficient product possesses beauty—plus day in and day out serviceability—many of its merchandising problems are overcome.

The manufacturers of Willson Safety Goggles have found that Nickel Silver supplies this attractiveness and sturdiness in abundance. What's more, it provides an equally important third requirement—economy of fabrication . . . for Nickel Silver is one of the most workable metals available.

If the manufacture and sale of your product could be enhanced through this combination of clear-through beauty, ready workability and a longer service life—think in terms of Anaconda Nickel Silver. The American Brass Company can supply both the metal and the know-how, for each year it produces millions of pounds in all commercial forms, in all standard compositions, finishes and tempers. The address is Waterbury 20, Connecticut; in Canada, New Toronto, Ontario. 5095

ANACONDA *the name to remember*

in **NICKEL SILVER**

SHEETS • STRIPS • PLATES • WIRE • RODS • BARS • TUBES

WHY SO MANY when 2 will do?

The extra wheels really won't get you anywhere. They just cause confusion.

Same way with alloy steels—surprising how many plants are discovering they can get along better using just two alloy steels, instead of four, five or more A.I.S.I. grades. With 2 Carpenter alloy steels you can get the physicals you need *plus* the advantages of Reduced Inventory, Low Cost Heat Treatment and Better Machining Time.

This is the ideal set-up for making alloy steel parts like gears, shafts, pinions, cams, etc.

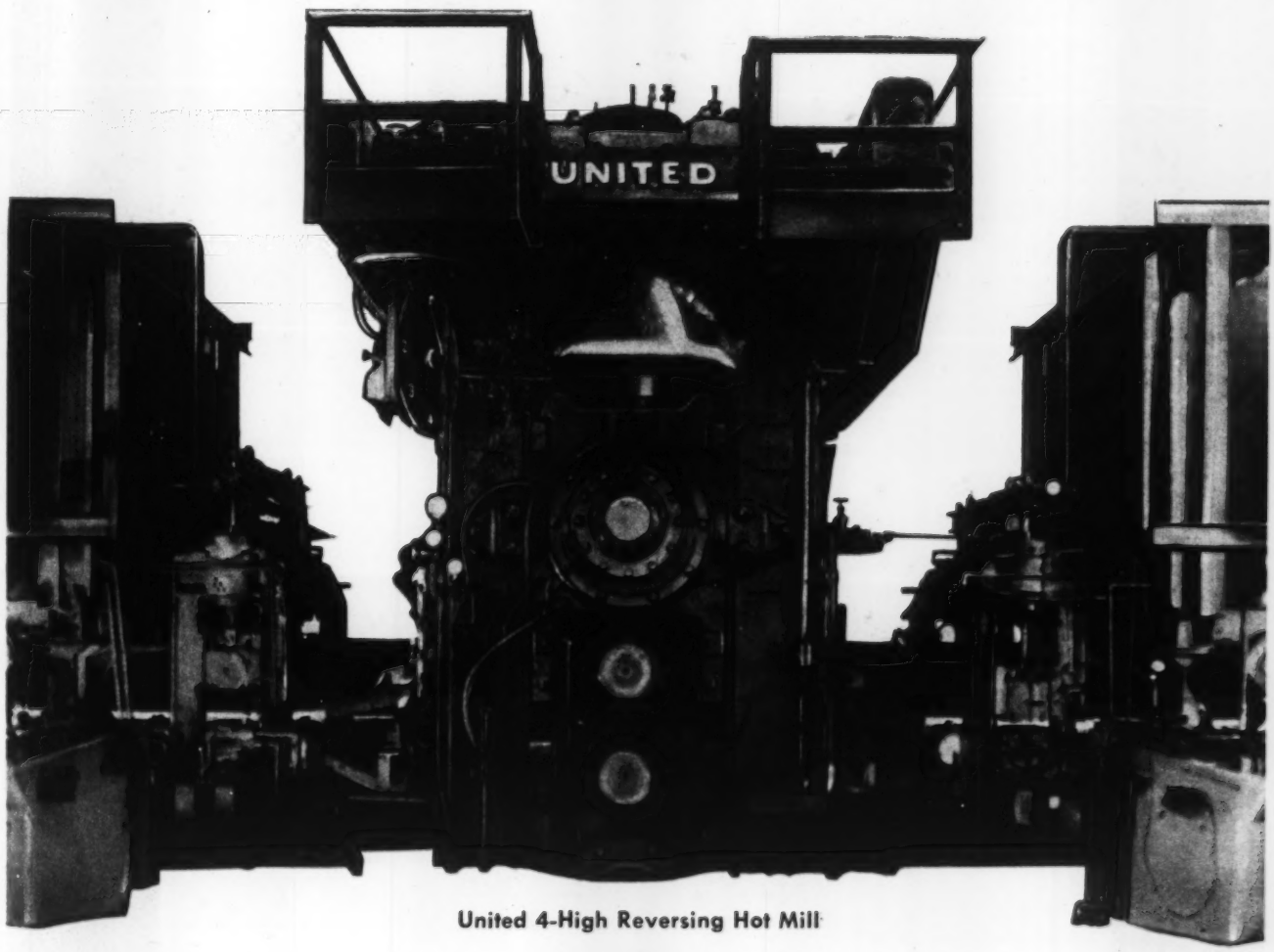
For the facts showing how 2 alloy grades can handle most of your maintenance and production jobs, write for a copy of Carpenter's unusual booklet called "2 Steels". It will give you complete data on mechanical properties, heat treatment, stock sizes and recommended uses.

THE CARPENTER STEEL COMPANY • 139 W. Bern Street, Reading, Pennsylvania

Only Carpenter Gives You This Way to Replace Many A. I. S. I. Grades With Just 2 Alloy Steels

Designed and built by

UNITED



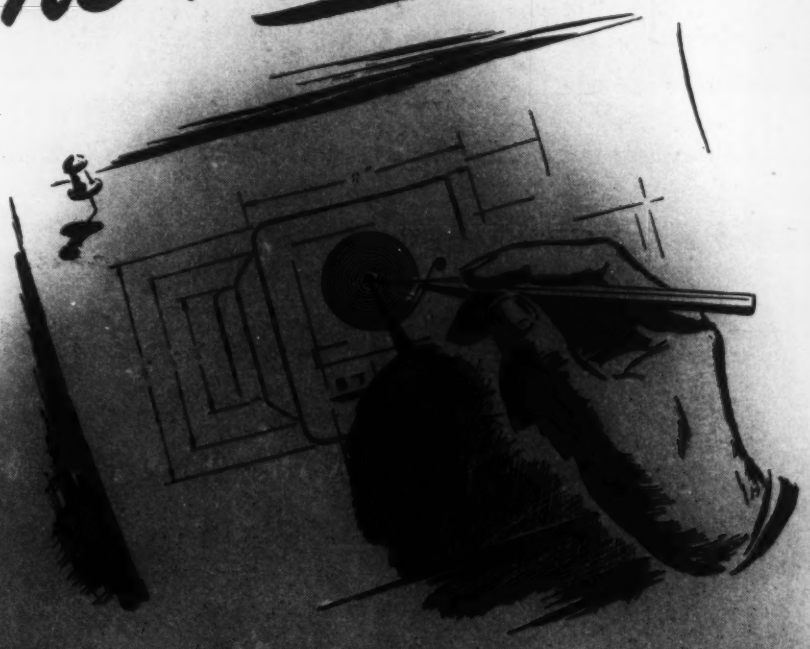
United 4-High Reversing Hot Mill

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

DESIGNERS AND MAKERS OF ROLLS AND ROLLING MILL EQUIPMENT

Today it's Roebling!



Why production men choose Roebling Cold Rolled Spring Steel

IT'S BEEN PROVED in plants the country over . . . that Roebling Cold Rolled Spring Steel saves preparation time on machines, minimizes machine stoppages, and cuts down the number of rejects. And this is only natural! Every inch of Roebling Spring Steel is identical in gauge, grain and finish . . . meets users' specifications with absolute uniformity.

Roebling Cold Rolled Spring Steel is available annealed, hard rolled untempered; scaleless tempered; tempered and polished; tempered, polished and strawed; or tempered, polished and blued.

Your Roebling Field Man will gladly help you choose the cold rolled spring steel, or round, flat or shaped wire, that will improve your product and your production. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING *A CENTURY OF CONFIDENCE*

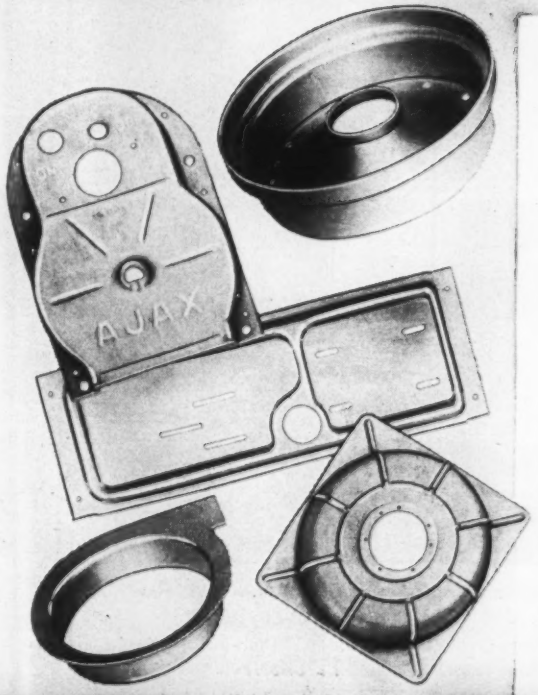
Atlanta, 934 Avon Ave. ★ *Boston,* 51 Sleeper St. ★ *Chicago,* 5525 W. Roosevelt Road ★ *Cincinnati,* 3253 Fredonia Ave. ★ *Cleveland,* 701 St. Clair Ave., N. E. ★ *Denver,* 4801 Jackson St. ★ *Houston,* 6216 Navigation Blvd. *Los Angeles,* 216 S. Alameda St. ★ *New York,* 19 Rector St. ★ *Philadelphia,* 12 S. Twelfth St. ★ *Portland,* 1032 N. W. 14th Ave. ★ *San Francisco,* 1740 Seventeenth St. ★ *Seattle,* 900 First Ave. S.

NEW, MODERNIZED

Firestone Metal Stampings Division

....Brings You

COST REDUCTIONS on CONTRACT STAMPINGS



NOW, two modern stamping plants to serve you—right in the heart of the metal working area. New, modernized Firestone Metal Stamping divisions at Akron, Ohio and Wyandotte, Michigan make possible contract stampings at attractive cost reductions. Here's why costs are lower:

1. Close study of manufacturing costs reduces every controllable cost factor to a minimum.
2. Reduced number of press operations.
3. Mass production — huge capacity and modern, efficient methods.
4. Shorter shipping distances—faster delivery, lower freight rates.

- ★ Stainless Steel
- ★ Carbon Steel
- ★ Aluminum

Every job backed by 40 years experience in fabricating intricate steel stampings to exacting tolerances for the automotive and appliance industries, produced and shipped *on schedule.*

If you must reduce costs on your products, it will pay you to *figure with Firestone.* We will gladly prepare a cost analysis. Simply write Firestone Steel Products Company, Metal Stampings Division, Akron 1, Ohio.

Firestone
STEEL PRODUCTS CO

The World's Largest Manufacturer of Stainless Steel Stampings

Copyright, 1950, The Firestone Tire & Rubber Co.

FASTER GRINDING — FEWER WHEEL DRESSINGS — LOWER COSTS

Economies gained by a New England plant* using TEXACO SOLUBLE OIL

In this spindle grinding operation, an emulsion of *Texaco Soluble Oil D* is far out-performing the previously used high-priced competitive coolant. This is shown by a comparative run in which the same number of pieces was ground with each lubricant in turn.

Throughout the test, the wheel protected by the *Texaco Soluble Oil* emulsion required no dressing at all. Wheel size and corners were adequately maintained. With the competitive coolant, wear and corner breakdown sufficient to require wheel dressing occurred before half the run was completed.

In addition, *Texaco Soluble Oil* kept the wheel open, assuring faster cutting and better finish, and considerably reduced the total time for the run.

Examples like this of lower cost machining are the rule when *Texaco Cutting, Grinding and Soluble Oils* are on the job. A Texaco Lubrication Engineer will gladly help you gain these same benefits in your plant—whatever your metal working operations. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Operation: Grinding spindles to remove .020" stock
Metal: 4150 steel, hardened to 40-45 Rockwell
Machine: Cincinnati Filmatic, 10" cylindrical grinder
Emulsion: Texaco Soluble Oil D at 58:1

*Name of this Texaco user on request

TEXACO

TEXACO CUTTING, SOLUBLE AND GRINDING OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. See newspaper for time and station.

LEADING RANGE BUILDER SAVES $2500 THE FIRST MONTH WITH McKAY LEVELER

Newark Stove Co., Newark, Ohio, was experiencing difficulty with deep drawing certain parts of their ranges. They found the grain structure of the steel to be too irregular due to aging — causing stretcher strain or breakage in the draw. An experimental load of this same steel was run through a McKay leveler at another plant and was found to then take the draw easily, without a sign of stretcher strain.

Newark immediately installed their own McKay and at the close of the first 30 days found they saved 7714 pieces that would ordinarily have been scrap. **The savings in material and labor amounted to $2477.11.**

On a special circulator heater end panel, that also required a difficult draw, Newark was averaging 80 pieces of scrap for every 5000 panels. **After running the same steel through the McKay they found but a single failure in 1151 panels checked.**

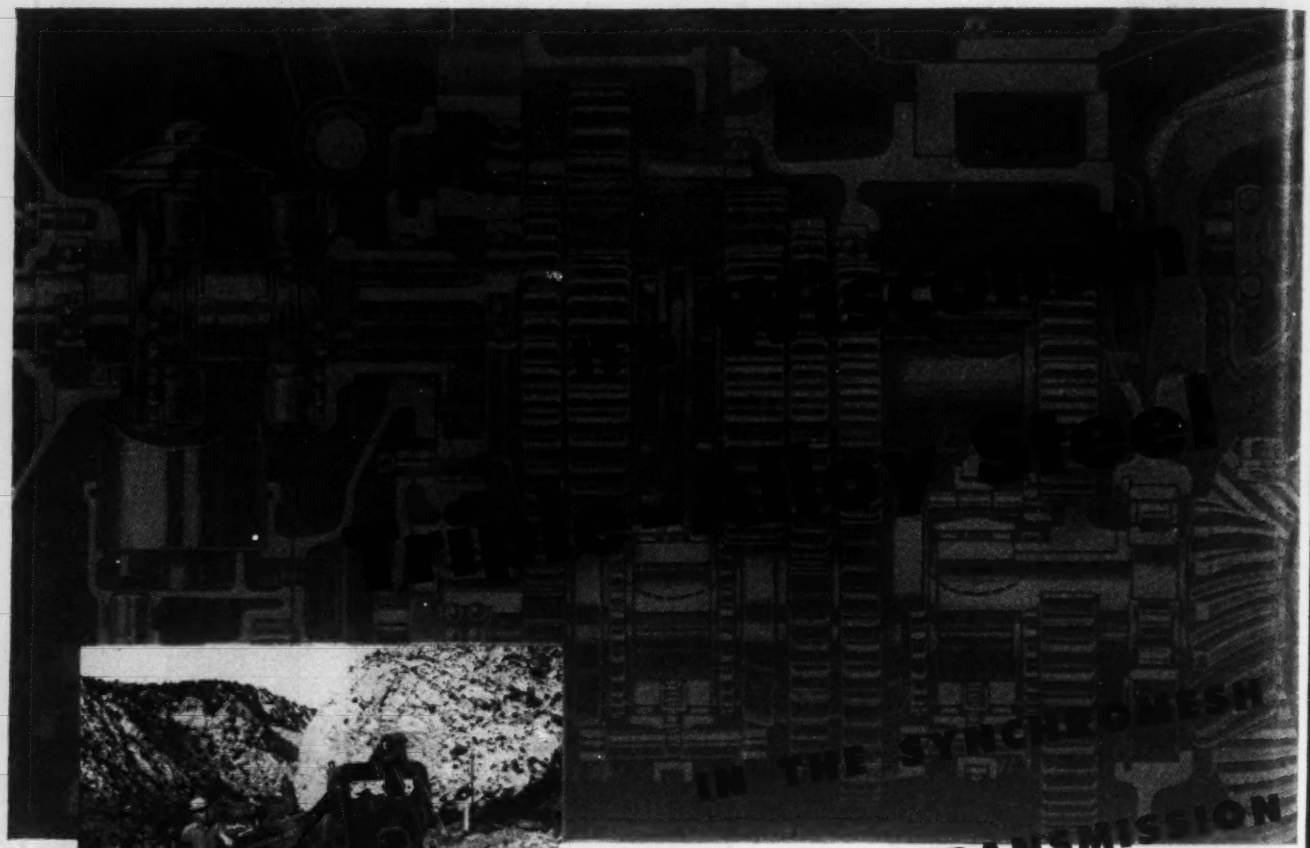
McKay Levelers are sturdily constructed heavy-duty machines designed to deliver everlasting, dependable service. Almost without exception McKay users find the machine pays for itself in a few short months by slashing scrap losses, boosting production and cutting die failures to a minimum.

Let McKay engineers look over your operation. No obligation. Call or write to—

THE McKAY MACHINE COMPANY

Engineers and Manufacturers of Sheet, Tin, and Strip Mill Equipment

YOUNGSTOWN, OHIO



IN THE WORLD'S MOST POWERFUL CRAWLER TRACTOR

Where gears get a beating—in the synchromesh transmission of the International TD-24, the world's most powerful crawler tractor—they're made of Wisconsin triple-alloy steel. And thousands of automotive transmissions are fabricated from this same high quality alloy steel.

Quality counts here. And quality is the watchword at Wisconsin Steel. That's why we invite you to contact our sales and metallurgical staffs when you need steel. Our entire organization is ready to serve you.

INTERNATIONAL HARVESTER

WISCONSIN STEEL COMPANY, Affiliate of INTERNATIONAL HARVESTER COMPANY

180 North Michigan Avenue • Chicago 1, Illinois

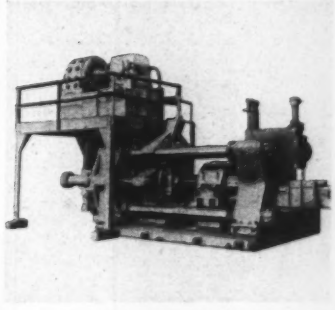
WISCONSIN STEEL

AN EXTRUSION PROBLEM A *Lombard* PRESS CAN'T LICK!

Here's why users say their light metals extrusion problem went out the window the day their Lombard press came in the door...

Lombard pioneered the application of the self-contained, oil hydraulic system to an extrusion press.

• *Result: Installation occupies far less floor space. Releases valuable square-footage for fabrication, assembly and other operations.*



Lombard 4-Column Hydraulic Extrusion Press. Preferred by the companies that are going places in American Industry.

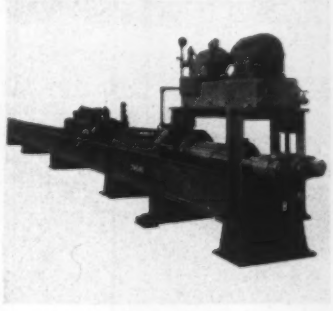
Advanced design and simplicity of operation assures high production rate at low operating cost.

• *Result: As many as 60 complete cycles per hour: as high as 90 pounds of extrusions per man hour of operation.*

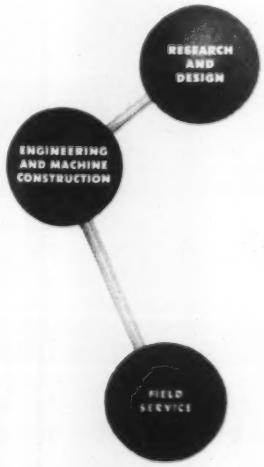
Design of press with integral fabricated bed plate provided with hardened steel ways to guide cross-head makes for easier, quicker alignment and lower maintenance.

• *Result: Less wasteful down-time: more profitable operating time.*

There are many other sound, experience-proved reasons why you should ask for complete information on how quickly and completely a Lombard extrusion press will solve your extrusion problem. That's why we say, For Greater Profits Tomorrow... Talk to Lombard Today!



Lombard Hydraulic Stretcher



IT MAKES DOLLARS AND SENSE TO OWN YOUR OWN EXTRUSION EQUIPMENT.

Upon request, we will provide definite, factual data to prove that it's more profitable to own your own extrusion equipment. Call, wire or write today. A Lombard sales engineer will contact you in 24 hours or less.

LOMBARD CORPORATION

EMPIRE BUILDING • YOUNGSTOWN 3, OHIO

EXPORT DIV. 342 MADISON AVE. • NEW YORK 17, N.Y.

EQUIPMENT MANUFACTURED BY UNITED ENGINEERING AND FOUNDRY CO., PITTSBURGH, PA.

Look at these COST-CUTTING FEATURES of the New NORTON Type CTU Cylindrical Grinders

1. Close-Approach Rear Base Design
2. Stand-Up Electrical Controls Mounting
3. Swing-Back Wheel Guard Cover
4. Mist-Control Hinged Hood
5. Easy-Swing Nozzle Mount
6. The Famous NORTON Wheel Spindle Unit
7. Space-Saver Ribbon Type Base Way Guards
8. Quick-Clean Coolant Ramp
9. Feather-Touch Work Jogging Lever
10. Finger-Tip Automatic or Manual Work Rotation Selector
11. Silky-Sure Hand Table Traverse
12. Quick-Action Pre-Set Truing and Grinding Speed Control
13. Either-End Table Dwell Control
14. No-Search "Click-Count" Wheel Feed Mechanism
15. "One-Lever" Grinding Cycle Control for Semi-automatics
16. Instant-Action Automatic Feed Rate Controls
17. Knee-High Hydraulic and Lubricating Pump Mounting

Compare Them With Your Present Equipment

Here are 17 of the reasons why you'll like the new Norton line of 6" and 10" cylindrical grinders—17 features that give new ease of operation and new ease of maintenance.

Compare these features with your present equipment. You will see how new efficiencies can be achieved with Norton CTU's that will give you the lower grinding costs so essential today.

New Features—New Catalogs

The outstanding features of these new Norton Grinders are graphically illustrated and described in a new series of catalogs. Write for any or all—no obligation.

Catalog 157-2—Norton 6" Type CTU Cylindrical Grinders.

Catalog 1488-1—Norton 6" Type CTU Semiautomatic Cylindrical Grinders.

Catalog 166-2—Norton 10" Type CTU Cylindrical Grinders.

Catalog 1787-1—Norton 10" Type CTU Semiautomatic Cylindrical Grinders.

NORTON COMPANY

Eliminates Leaks...Boosts Production 300% with "Manual Lincolnweld"

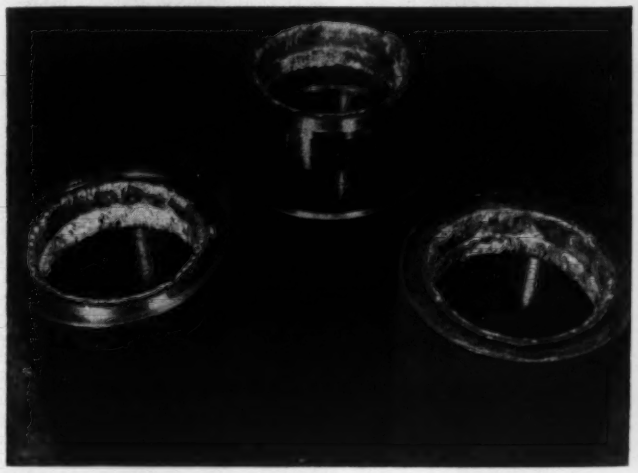


Fig. 1. Production up 300%. *Above (center) is honed cylinder ready for steel insert. At left, assembly is ready for "Manual Lincolnwelding." At right, solid one-piece unit after welding.*

Fig. 2. "Manual Lincolnwelding" *at The Ohio Honing and Hydraulic Co., Cleveland, Ohio. Fixture rotates past welding gun. Note absence of spatter and smoke for easier, safer welding.*

By ALBERT BLEWETT, President
The Ohio Honing and Hydraulic Co.
Cleveland, Ohio

Dense, uniform welds now being produced faster and easier with the "Manual Lincolnweld" are eliminating former difficulties of leakages in hydraulic cylinders resulting from porosity in welds. Hard spots in weld metal have been overcome, greatly simplifying subsequent machining operations. In addition to a better design, the rate of production has been increased 300%.

The cylinder is made from high carbon tubing (Fig. 1) that has been previously bored and honed. The 1020 steel insert, faced on the inside diameter with bronze, is pressed and welded to the cylinder. The welding is done in a rotary fixture (Fig. 2) that moves the work past the electrode. With "Manual Lincolnweld" the electrode is fed automatically into the work at a predetermined rate set on the welder controls. The granular flux, fed from the welding "gun", maintains a protective blanket over the arc to shield the arc during welding and thus produces a smooth, uniform weld having deep penetration.

A flux dam (Fig. 3) made from a carbon ring is used to confine the granular flux and facilitate easy recovery of unused flux with a vacuum recovery unit. The slag is then quickly removed with an air operated chipper. After welding, the end of the cylinder is faced and the insert bored. The final operation is simply to grind the outside diameter of the cylinder to size.

WELDING IS DONE AFTER MACHINING

With "Manual Lincolnweld," the welding can be done after the inside diameter of the cylinder has been honed to size. By means of its concentrated arc welding beneath the covering of granular flux, welds can be completed with negligible distortion.

Fig. 3. Removes Flux *with vacuum recovery unit shown above, at left. At right is chipping of weld slag in trough of flux dam.*

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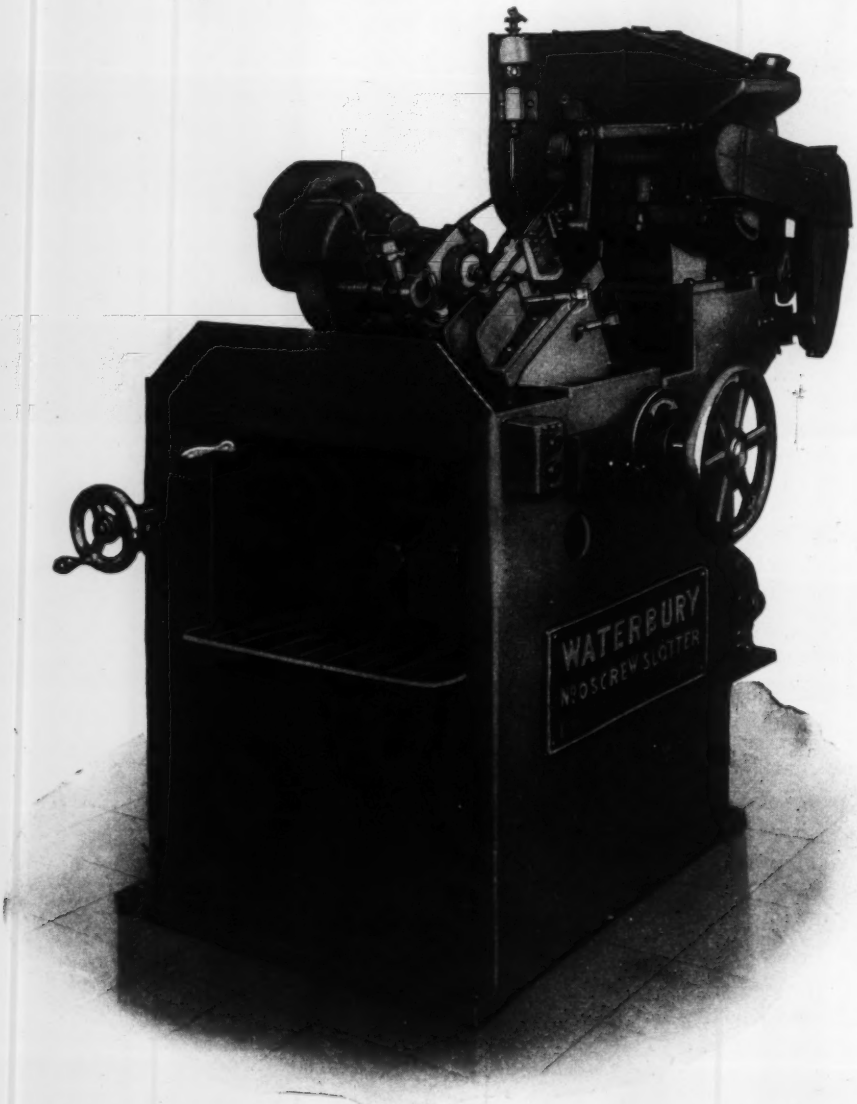

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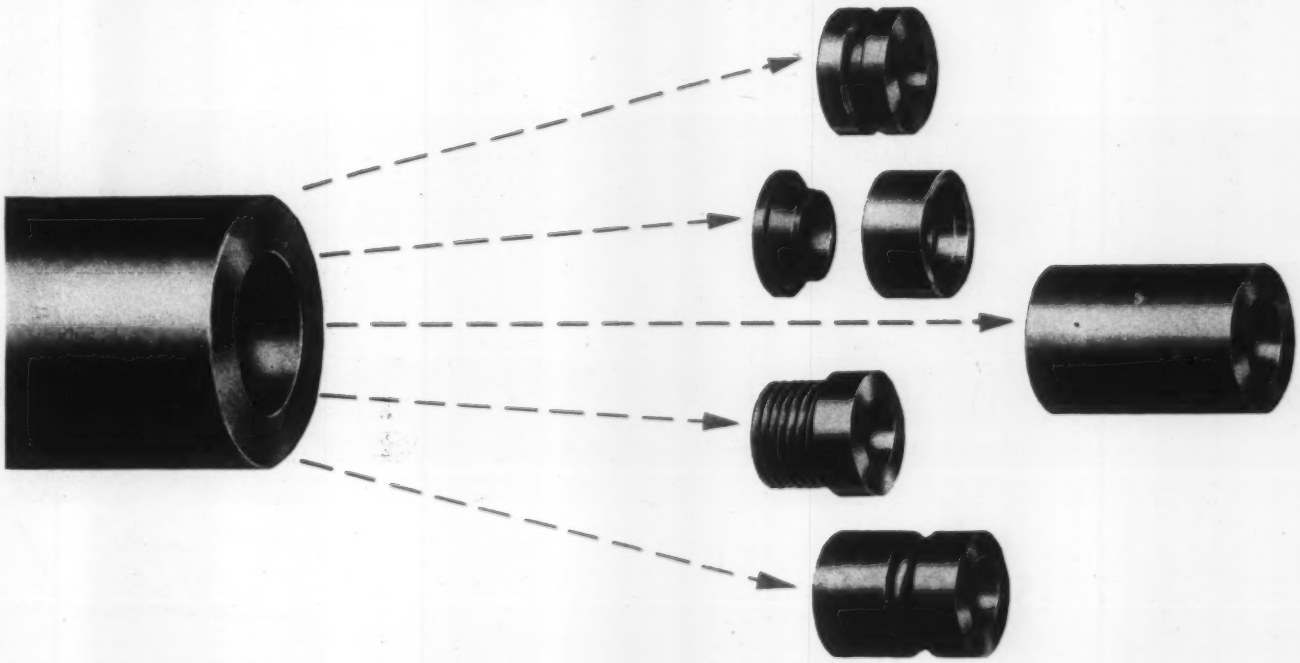

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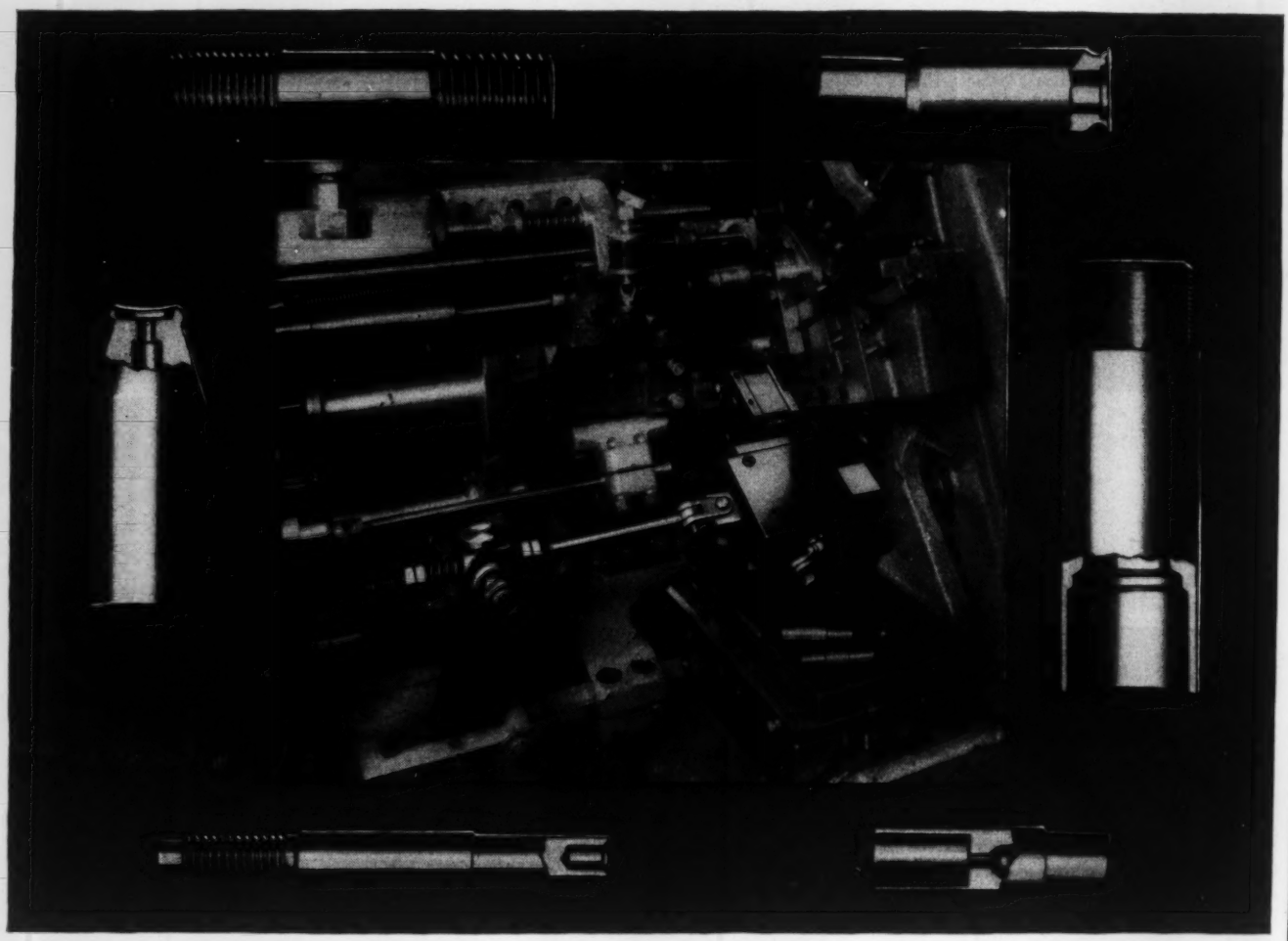

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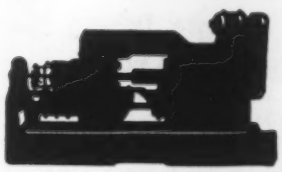

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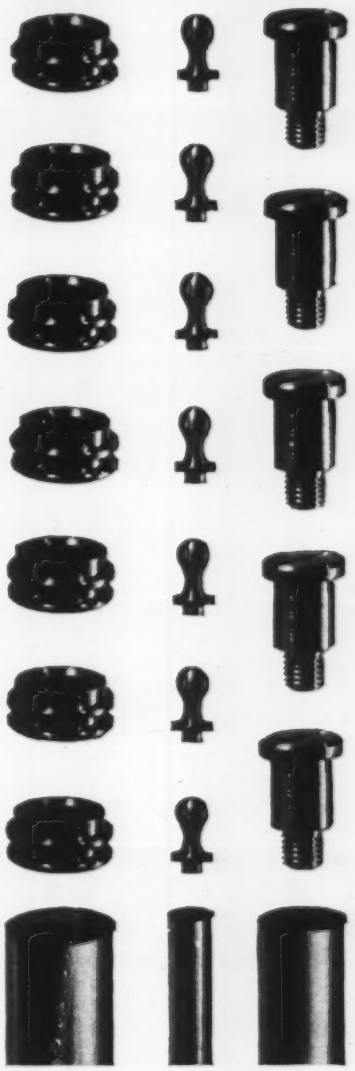

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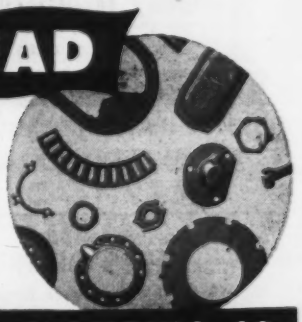

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Accurate Spring Mfg. Co. 136
Aldrich Pump Co., The 126
American Brass Co., The 25
American Bridge Co. 22, 23
American-Fort Pitt Spring Division of H. K. Porter Co., Inc. 131
American Gas Association 24
American Hoist & Derrick Co. 15
American Shear Knife Co. 135
American Steel & Wire Co. 22, 23
Atlas Car & Mfg. Co., The 125
Atlas Mineral Products Co., The 137

Bailey, William M., Co. 128
Baker, J. E., Co., The 135
Baldwin-Duckworth Division of Chain Belt Co. 20
Bedford Foundry & Machine Co. 134
Belmont Iron Works, The 137
Bethlehem Steel Co. 1
Bixby, R. W., Inc. 141
Blaw-Knox Co., Pittsburgh Rolls Division 8, 9
Brosius, Edgar E., Co., Inc. 96
Budd Co., The 139
Buffalo Forge Co. 106
Bullard Co., The 50

Carnegie-Illinois Steel Corporation 22, 23, 127
Carpenter Steel Co., The 26
Chain Belt Co., Baldwin-Duckworth Division 20
Chicago Perforating Co. 139
Cincinnati Machinery Co., Inc. 140
Clearing Machine Corporation 98
Cleveland Steel Tool Co., The 137
Cleveland Worm & Gear Co., The Inside Back Cover
Climax Molybdenum Co. 130
Colorado Fuel & Iron Corporation, The, Wickwire Spencer Steel Division 16
Columbia Steel Co. 22, 23, 127
Consolidated Western Steel Corporation 22, 23
Copperweld Steel Co. 53
Crucible Steel Company of America 10
Cullen-Friestedt Co. 132
Cutler-Hammer, Inc. Back Cover
Cyclone Fence Division, American Steel & Wire Co. 22, 23

Dearborn Chemical Co. 91
De Laval Steam Turbine Co. 107
Denison Engineering Co., The 5
Dependable Sales Corp. 141
Diamond Mfg. Co. 137
Differential Steel Car Co. 137
Dulien Steel Products, Inc. 140
Du Pont, E. I., de Nemours & Co., Inc. 13

Eastman Kodak Co. 79
Electric Controller & Mfg. Co., The Inside Front Cover
Enterprise Galvanizing Co. 137
Euclid Crane & Hoist Co., The 132

Finkl, A., & Sons Co. 12
Firestone Steel Products Co. 33
Follansbee Steel Corporation 94
Foster, L. B., Co. 141

General Electric Co., The 88, 89
Gerrard Steel Strapping Co. 22, 23
Gisholt Machine Co. 2
Gordon, Claud S., Co. 130
Granite City Steel Co. Front Cover

Harnischfeger Corporation 121
Harnischfeger Corporation, Welding Division 19
Hendrick Manufacturing Co. 134
Hoover Ball & Bearing Co. 97
Horsburgh & Scott Co., The 123
Hubbard, M. D., Spring Co. 139
Hyde Park Foundry & Machine Co. 139

Illinois Clay Products Co. 104

Jones & Laughlin Steel Corporation 99

Keystone Steel & Wire Co. 124

Landis Machine Co. 6
Lincoln Electric Co., The 81
Lombard Corporation 61

McKay Machine Co., The 45
McKee, Arthur G., & Co. 77

Macwhyte Co. 3
Mahon, R. C., Co., The 105
Manheim Manufacturing & Belting Co. 93
Mesta Machine Co. 75
Midwest Steel Corp. 140
Morgan Construction Co. 30

National Acme Co., The 86
National Steel Corporation 59
National Tube Co. 22, 23
New York Belting & Packing Co. 7
Northern Malleable Iron Co. 141
Norton Co. 62, 95

Oakite Products, Inc. 138
Ohio Locomotive Crane Co., The 139
Oil Well Supply Co. 22, 23

Perkins, B. F., & Son, Inc. 133
Pittsburgh Rolls Division of Blaw-Knox Co. 8, 9
Porter, H. K., Co., Inc., American-Fort Pitt Spring Division 131
Powdered Metal Products Corporation of America 107

Remmey, Richard C., Son Co. 4
Republic Steel Corporation 21
Roebling's, John A., Sons Co. 28
Ryerson, Joseph T., & Son, Inc. 36

Scovill Manufacturing Co. 142
Seaboard Steel Co., Inc. 141
Standard Oil Co. (Indiana) 17, 18
Stuart, D. A., Oil Co., Ltd. 122
Sugarman Equipment Co. 140

Tennessee Coal, Iron & Railroad Co. 22, 23, 127
Texas Co., The 34
Thomas Machine Manufacturing Co. 131
Thomas Truck & Caster Co. 141
Trabon Engineering Co. 64
Tube Reducing Corporation 85

Union Supply Co. 22, 23
Unitcast Corporation 92
United Engineering & Foundry Co. 27
United States Steel Corp., Subsidiaries 22, 23, 100, 127
United States Steel Export Co. 22, 23, 127
United States Steel Products Co. 22, 23
United States Steel Supply Co. 22, 23, 100
Universal Atlas Cement Co. 22, 23

Virginia Bridge Co. 22, 23

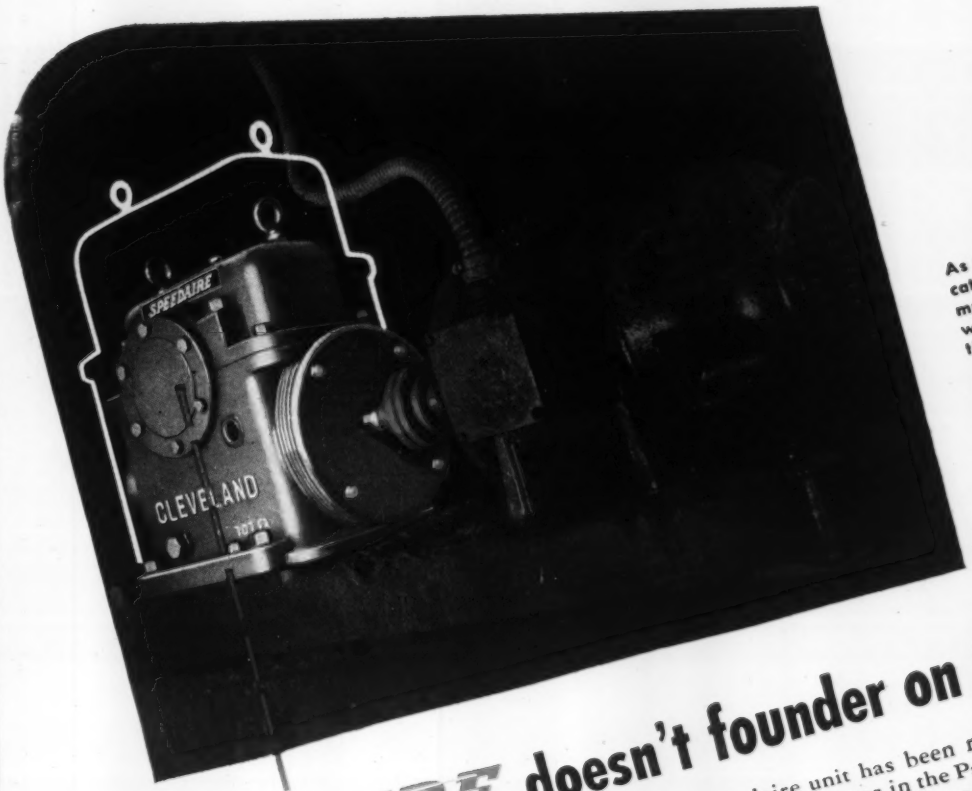
Waterbury-Farrel Foundry & Machine Co. 82
Weirton Steel Co. 59
West Penn Machinery Co. 141
Wheelock, Lovejoy & Co., Inc. 129
Whitehead Stamping Co. 139
Wickwire Spencer Steel Division, The Colorado Fuel & Iron Corporation 16
Williams-White & Co. 133
Wisconsin Steel Co. 46

Yoder Co., The 11
Youngstown Sheet & Tube Co., The 14

~ ~ ~

Table of Contents Page 29

Classified Advertising Pages 140, 141



As the white outline indicates, a standard unit of much greater frame size would be required to do the work of Speedaire.

Photograph by courtesy of the Packard Motor Car Company.

SPEEDAIRE doesn't founder on foundry sand

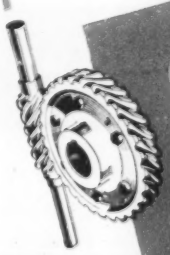
FOR well over a year, this Speedaire unit has been running continually, driving a spiral conveyor in the Packard Production Foundry at Detroit. As the photograph reveals, operating conditions are quite severe, both motor and reducer being subjected constantly to sand and grit.

Speedaire was selected for this service because of the three-way saving it offered, compared to the conventional worm gear speed reducer. Speedaire is 23½% lighter in weight, takes 38% less space and costs 12½% less money than the standard unit required to do the job.

Speedaire is Cleveland's fan-cooled worm-gear speed reducer. Because it is fan-cooled, Speedaire will do more work—will deliver up to *double the horsepower* of standard worm units of equal frame size, at usual motor speeds. It can be installed economically on many applications where other types have been used heretofore—giving you the advantage of a compact right-angle drive. Speedaire gives the same long, trouble-free service characteristic of all Clevelands.

For full description, send for Catalog 300. The Cleveland Worm & Gear Co., 3270 East 80th St., Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers, Limited.



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Worm Gear
Speed Reducers

EVERY TYPE OF OPERATOR

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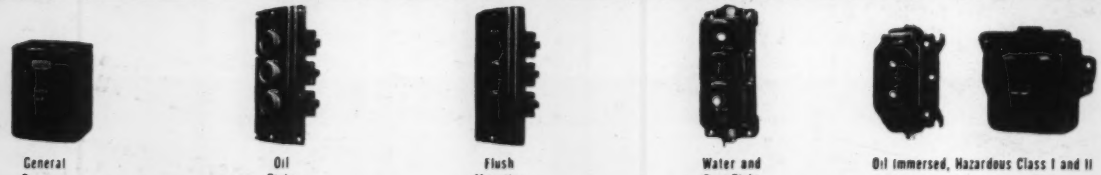
EVERY TYPE OF STATION



General Purpose | Oil Tight | Flush Mounting | Water and Dust Tight | Oil immersed, Hazardous Class I and II

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The Cutler-Hammer line of heavy duty pushbuttons offers the widest selection, by far, of operators, elements, stations and circuit combinations. This line has the unique distinction of being designed and engineered from the very start for such broad coverage of needs . . . through the development of a fundamentally correct contact mechanism capable of being incorporated into diversified types of elements, an equally modern and extensive line of operators . . . and a maximum number of circuit combinations.

As a result, users have gained such advantages as: complete interchangeability, uniformity of design and performance, exceptionally long life, frequently the elimination of any need for additional relays, interlocks and the like, ease of installation through visible contacts which facilitate circuit identification and terminals which are unusually large and accessible, and attractive appearance. All basic elements have successfully undergone Underwriters' tests. Here is a line attractive to machine designers, machine buyers and maintenance men alike. CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

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